

# Technology Review

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- ◆ HERBERT BENSON:  
WHEN THE MIND  
HELPS HEAL THE BODY
- ◆ SCIENCE ON THE  
INTERNET
- ◆ EXPLAINING  
INEXPLICABLE  
ACTS OF VIOLENCE

## ENGINEERS UNDERCOVER

UNSUNG HEROES OF  
THE COLD WAR



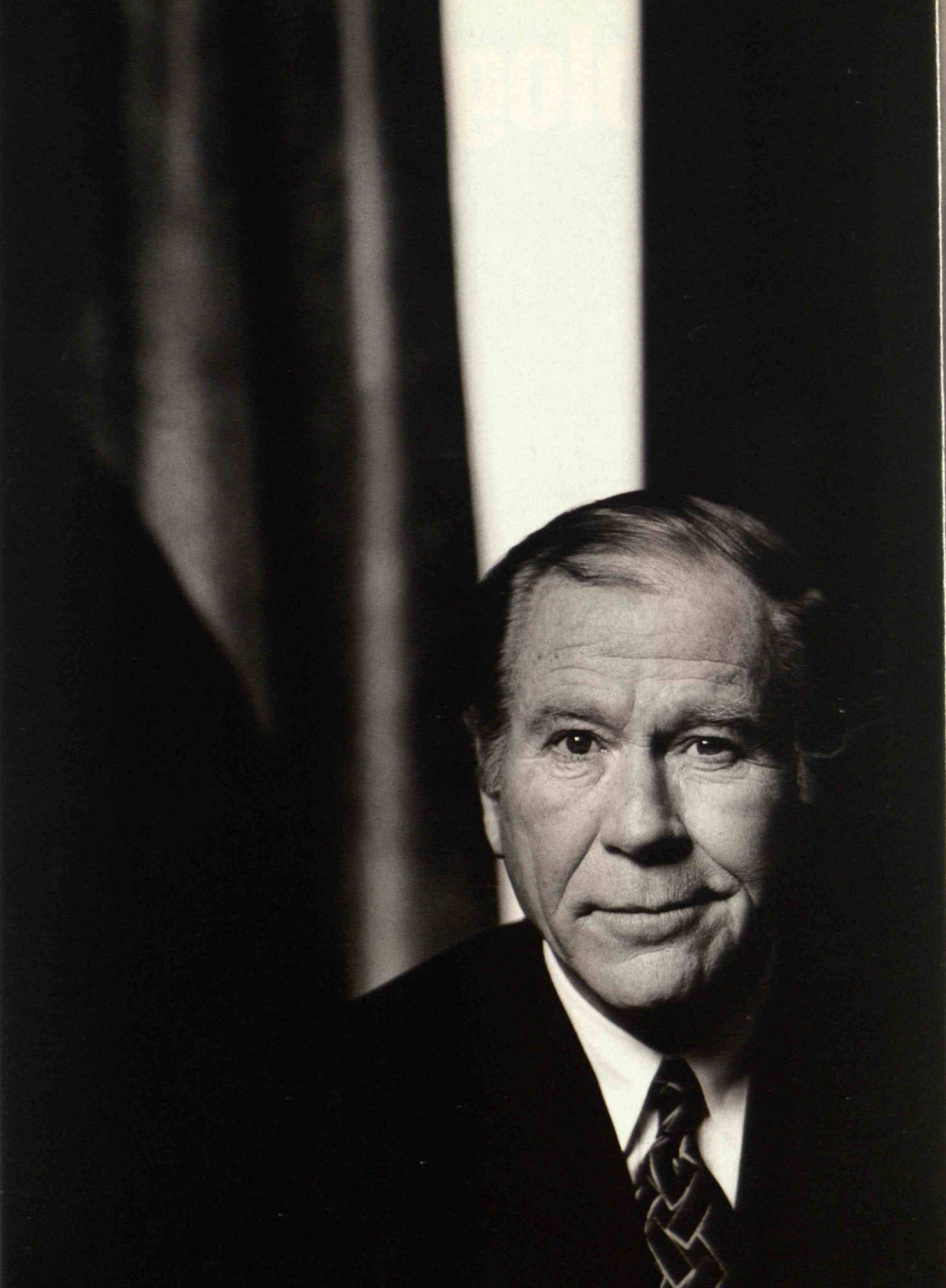
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# technology review

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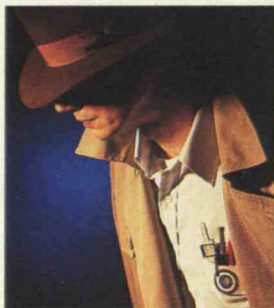
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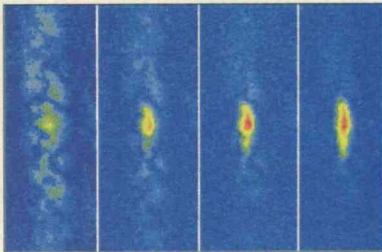
After years of study of a bizarre type of homicide—committed without motive, plan, or even emotion—a prominent forensic psychiatrist proposes a controversial new theory: some social loners who internalize problems that most of us vent to family or friends may risk a “mindstorm” that can trigger violent acts. In fact, such brain seizures may occur in varying degrees throughout the population, provoking less extreme but still destructive behavior.



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# First Line

## LESSONS ON THE ICE

*Modern technological  
systems, so effective and  
transparent, allow us  
to forget that we are  
all interdependent  
companions on an  
arduous journey.*

THE winds stilled. The temperature climbed to zero. A lone Twin Otter aircraft appeared on the horizon and landed at our remote campsite—three canary-yellow Scott tents anchored on the West Antarctic Ice Sheet.

The plane came for me alone. The others still had weeks of work here. I had struck my tent and packed my orange survival bags. I was numb with cold, dumb with altitude, and giddy with the thought of a bed more inviting than a foam pad on a block of ice two miles thick.

Until that moment, I considered our campsite—located almost 800 miles from the main U.S. base in Antarctica—the precise geographic middle of nowhere. How blithely the aircraft erased that hard-won distance. The plain on which I waited, seemingly infinite in its immaculate emptiness, contracted.

The aircraft's sudden appearance forcibly reminded me how our modern tools, so often so much larger than ourselves, transform us. They may allow us to traverse in hours the expanses that took earlier explorers years to cross, but they also cultivate in us a contempt for such distance. Indeed, with planet earth so entwined with satellite systems, fiber optics, and high-speed computer links, we persuade ourselves that we have collapsed geography and that the journey is no longer necessary.

I arrived at this unmapped spot in Antarctica—located at approximately 78 degrees latitude south and 128 degrees longitude west—in the fall of 1995, traveling here as a journalist with a team of six glaciologists under the auspices of the National Science Foundation.

What brought the scientists here was neither gold nor gems nor the promise of hydrocarbons. They came to mine the ice for information—drilling for the pristine crystals that have accumulated in annual layers for millennia. I can think of no physical state more transient than that of a snowflake; yet here the ice is the measure of eternity. In places, it is 500,000 years thick. In the laboratory, those crystals can reveal the chemistry of earth's ancient atmosphere, the rapid fluctuations of the planet's climate, and the global reach of pollution.

The distance we traveled to get here, in a freezing wind on a bucking sled hauled by a snowmobile, was a journey of more than

time and miles. It measured the limits of the tools we use to bridge these gaps. Devices meant to guide our journey were defeated by the extreme conditions. Our handheld Global Positioning System receivers, for example, which under more normal circumstances could plot our position by satellite to within a few feet, simply froze. In the end, we found our way here like ants crawling across a slick white kitchen oilcloth—blindly, with our feelers outstretched.

We kept our bearings for the last 50 miles by marking our trail every 600 yards with a red flag, then moving forward by looking over our shoulders at the path we left behind. Eventually the swirling snow closed around us so completely that we could not see even those bright signposts.

In the developed world, we entrust our safekeeping to complex systems so intangible that most of us cannot begin to comprehend them—air traffic control, electronic banking, managed health care, commodities markets, the Federal Reserve. Even if we can master one of them, the others inevitably elude our understanding and control.

Survival on the ice, by contrast, forces a mastery of numerous practical details: how to overlay three pairs of gloves so the

wind cannot freeze the exposed flesh of your wrists; how to adjust snow goggles over a facemask, a parka hood, and a neck warmer so you can still breathe; how to sleep so your sweat-soaked felt inner soles do not freeze; how to arrange the zippers of your sleeping bag so its cold metal does not burn your skin.

On the ice, my more experienced companions saw to my safety when my ignorance put me at risk. I relearned humanity's oldest lesson: survival is an act of dependence. While we celebrate individual strength, it is symbiosis at which our species most excels. We are, after all, colony creatures at heart, and inside every cell of our bodies we carry the ancestral signature of cooperative arrangements.

Even on the ice, I was at the frayed end of an invisible lifeline stretching across half the planet. Our camp was at the center of a web of radio checks, rescue contingency plans, weather station forecasts, radar sweeps, and resupply manifests involving hundreds if not thousands of people on three continents.

The memory of that vivid experience recently came back to me as I sat in the window seat of a Boeing 737 jet flying over Cedar Rapids, Iowa, suspended at 33,000 feet between coasts. A vast cloud front enveloped the earth below from horizon to horizon, rippled like the ice fields of Antarctica and glowing with pale sunset shades of coral and rose.

I was reminded then that I was kept aloft not by jet engines or applied principles of physics but by a web of relationships with millions of people whom I do not know, whose faces were hidden from me by the clouds below. By freeing us from focusing on so many basics of survival, technology appears to release us from our dependence on each other. In truth, it only distances us from those on whom we ultimately depend, making them invisible and easier to deny. As we insulate ourselves from the world around us, the failure to recognize this vulnerability—or, worse, mistaking it for strength—can prove dangerous. On the ice, at least, such an outlook is clearly fatal. ■

—ROBERT LEE HOTZ

*Hotz, a science writer at the Los Angeles Times, shared a Pulitzer Prize for earthquake coverage.*



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# Letters

## DESIGNING FOR THE CONSUMER

A more appropriate title for Hugh Aldersey-Williams's "Interactivity with a Human Face" (*TR February/March 1996*) would have been "Two-Faced Interactivity with a Human." Our short history of interacting with computers has spawned a love-hate relationship filled with frustration, deception, and even entrapment. Why do I have a negative attitude? As a cognitive psychologist, I side with humans rather than computers, and so far we have gotten the short end of the stick.

The article opens with a classic example, voice menus. Such menus require more time than the one or two minutes usually involved with a human agent. And whereas restaurant menus lay everything out before your eyes, a voice menu keeps you waiting for something you will soon forget.

Too often, interface design benefits the service provider, not the consumer. The provider, whether a bank or a movie theater, pays no labor costs for the already-purchased computer. It has plenty of time to keep you on the line—you and who knows how many other people at the same time!

As an interface becomes rich with text and graphics, it can also become more complex and confusing. Designers of ATMs, onscreen VCR programming, word processors, spread sheets, and even missile control systems have a larger palette and more tools for doing really bad design. What makes matters worse is that designers don't think like users. They create from the top down. Users then feel like outsiders trying to get into a system.

Corporate profits ultimately drive interface design. Although software

companies are setting up usability labs, users benefit only to a limited extent because marketing success is more important to quarterly profits than actual usability. Users are told a given product is user friendly while in reality they must waste time following steps that make no sense.

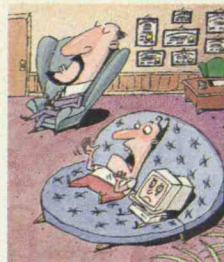
As with other consumer issues, we need a nonprofit consumer advocacy group that exposes the false user-friendliness of computer software and empowers

users. As a start, users should remember the following: (1) You are not a dummy. If you don't understand how to do something or can't remember how, the interface stinks. Complain! (2) If you made an error that cannot be corrected, it's the system's fault, not yours. Complain! (3) If anything requires more than three key presses, three mouse clicks, or three seconds, your time is being wasted. Demand your rights!

KENT L. NORMAN

Laboratory for Automation Psychology  
Department of Psychology  
University of Maryland  
College Park, Md.

Several suspect assumptions underlie Erwin V. Martinez's assertion in "You Call This Service?" (*TR April 1996*) that customers who are not receiving decent service would be better off interacting with computers. First, Martinez assumes the problem requires a technological solution, thus ignoring a company's responsibility to determine why its employees are behaving like automatons and to understand customers' frustrations. Second, the author ignores the wealth of social value attached to having a fellow human hand you your merchandise, even if he or she is rude. Third,



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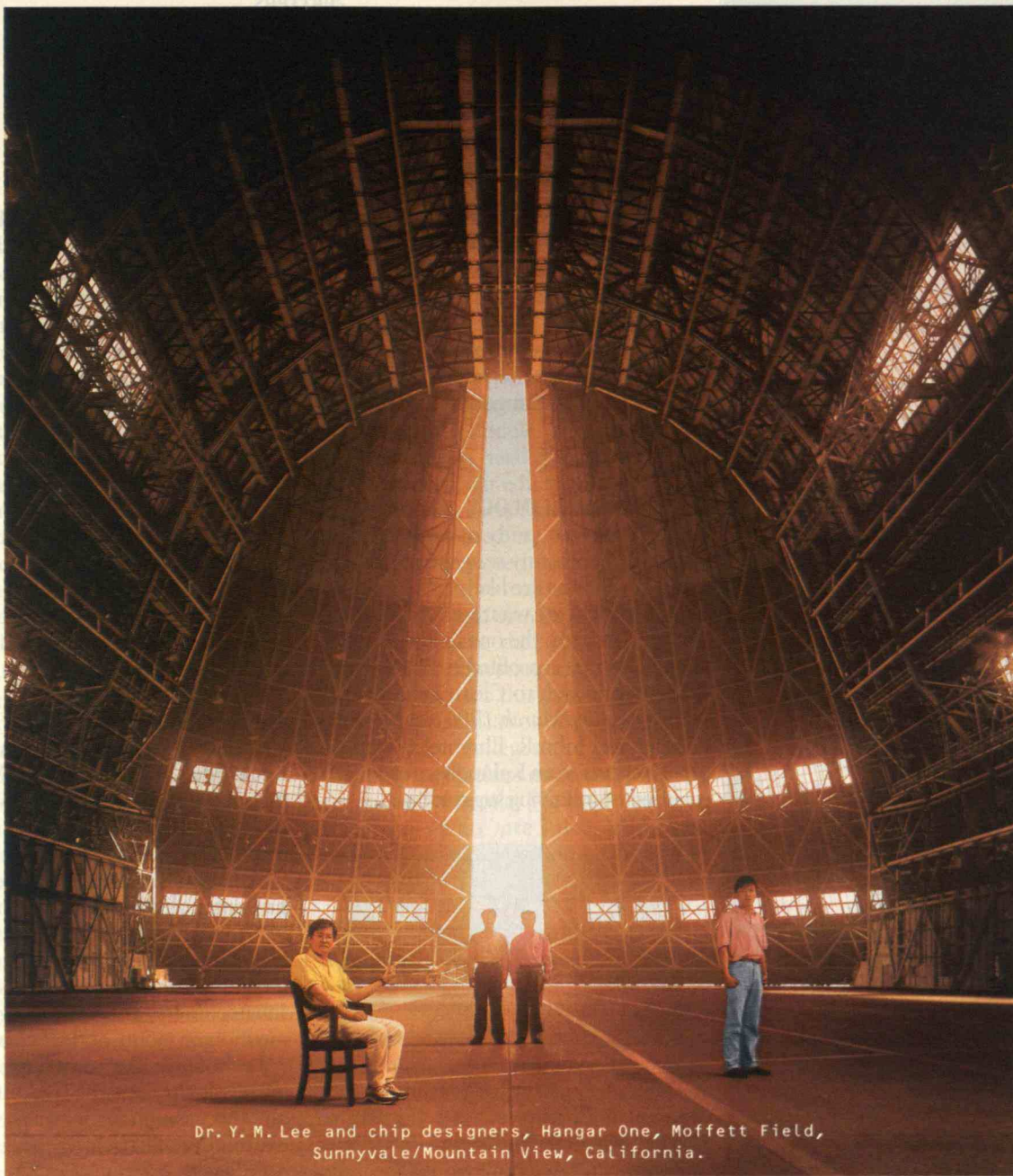
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Dr. Y. M. Lee and chip designers, Hangar One, Moffett Field,  
Sunnyvale/Mountain View, California.



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## LETTERS

the author implies that creating user-friendly computer systems is simple. As an interface designer, I struggle daily with the challenges of creating new technologies whose impact on consumers will be positive. Simply displaying "thank you" on the screen is a far cry from achieving that goal.

STEVE PORTIGAL  
Palo Alto, Calif.

### INDUSTRIAL ECOLOGY

In a recent EPA study of eco-industrial parks, our company sought to determine what conditions are likely to support the development of waste-exchange networks similar to the one in Kalundborg, Denmark, that is profiled in "A Down-to-Earth Approach to Clean Production" (*TR February/March 1996*) by Nicholas Gertler and John R. Ehrenfeld. We built upon reports from Kalundborg managers to offer the following suggestions:



- Teams seeking to form a similar network must not overplan. Trying to decide on exactly the "right" companies (or industries) to recruit would constrain the one-to-one deals of plant managers.
- Another useful step is to survey existing patterns of byproduct exchange in the region. This will often demonstrate that industrial symbiosis needs simply build upon existing practice. The survey will also highlight underused resources, such as waste heat from power and food-processing plants.
- A rich information flow will enable companies to discover the benefits of resource exchange, with or without colocation. Potential exchange members could rely on industrial databases, World Wide Web sites, and workshops.
- A concerted effort to establish a local byproduct exchange can spur the devel-

opment of new businesses. Many waste materials may need chemical or physical processing to be marketable. Companies may need new information and training services. Entrepreneurs can set up shop in these niches.

• Industrial ecologists have celebrated Kalundborg as the premier industrial ecosystem. But it is an error to reduce the concept (and the field) to a system of trading wastes. In many cases, eliminating wastes earlier in the cycle rather than trading them is the preferred solution.

ERNEST LOWE  
Indigo Development  
Oakland, Calif.

### TAKING THE HEAT OFF CO<sub>2</sub>

Two columns from *TR*'s February/March 1996 issue, "The Environment Backslide" by Robert M. White and "Cool Solutions for Global Warming" by Daniel Lashof, should be read together.

As White notes, past excesses are pushing politicians to undermine some of the good we've accomplished with environmental legislation. The environmental movement has gone well beyond science, facts, and rationality—not to mention economy and efficiency.

Lashof provides an example of this. In his missionary zeal, he studiously avoids any discussion of nuclear power when examining electricity-generating technologies that emit less CO<sub>2</sub>. He must know that nuclear fuel occupies second place among primary energy sources for the production of U.S. electricity. He must also know that nuclear generating stations emit no greenhouse gases, and, because of these two facts, obviously must be considered prime candidates for dealing with global warming.

J.J. SCOVILLE  
Westlake Village, Calif.

Lashof proposes economic incentives for achieving the 1992 Rio de Janeiro Climate Treaty's main objective of stabilizing greenhouse gases at a "safe" level—even though an objective benchmark has not yet been determined. Moreover, Lashof



focuses on CO<sub>2</sub> as the most menacing greenhouse gas without considering other major mechanisms influencing global climate. For example, deforestation reduced the reflection of solar energy back into space by replacing the cooling effect of foliage with homes, factories, streets, parking lots, and other heat-absorbing infrastructure.

We now know that atmospheric CO<sub>2</sub> and global temperatures have fluctuated dramatically over the past 160,000 years. However, human activity cannot be implicated as the culprit during most of this period. J.T. Overpeck, head of the National Oceanographic and Atmospheric Administration's paleoclimatology program, commented, "It is now clear the climate variability in many regions of the world . . . was significantly greater during the last 10,000 years than during the last 150 years." Note El Niño's influence on weather halfway around the globe. Studies have also linked global-climate variations to solar radiation and volcanic heat from the earth's core.

ALAN W. KATZENSTEIN  
Larchmont, N.Y.

### LEDERMAN'S REVOLUTION

As a high-school teacher, I agree with Leon Lederman in "Getting High-School Science in Order" (*TR* April 1996), as do most of my colleagues, that we are doing things backward. Unfortunately, the inertia in public education is staggering.

Lederman's revolution needs to proceed on several fronts. First, elementary-school teachers need tougher certification requirements in the sciences. Most such teachers are scared stiff of teaching any science other than dinosaurs, the solar system, and volcanoes. Perhaps their lack of confidence stems from the "need to know the correct answers." An entirely different philosophical approach is required based on observation, inquiry, and experimentation—a totally hands-on curriculum. Anything smacking of the

abstract should be left until children are developmentally ready for such reasoning. The teacher as scientific authority should never enter the classroom. Although many school systems have science-resource teachers, I feel that this practice sends the message that science is only for the "experts."

By contrast, middle- and high-school science teachers need degrees in the sciences rather than education. In fact, if the profound reorganization of the curriculum proposed by Lederman is to occur, teachers need to be educated in at least two of the major scientific disciplines, with basic courses in all sciences. I do not believe that science courses designed for education majors will prepare teachers for this curriculum. Not only must certification requirements be changed, but colleges and universities that prepare teachers must also radically revise their curricula. We need a cadre of scientists—who are also dedicated teachers—in the classroom.

DIANA DUCKWORTH  
Forest, Va.

While Lederman's arguments for reversing the traditional biology-chemistry-physics sequence make sense intellectually, I wonder whether such a rearrangement would actually engage more

youngsters. This should be our goal if we wish to have a scientifically or (better, I think) technologically literate society. Science is often abstract and counterintuitive. Technology helps make science real. As Rustum Roy, a leading architect of the science-technology-society approach to education, points out, the vast majority of the population does not need much of the abstraction, however powerful that may be to practitioners. What is important is that we all understand that science and technology does enter into our lives.

Through an integrated science curriculum, everyone could leave our K-12 system technically literate. The key is to teach science as an experiential process: to pursue core concepts through hands-



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on problem solving and inquiry, and in the context of familiar technologies. This is what the new National Research Council science-education standards encourage.

As we think about high-school science, we must also consider undergraduate education. Otherwise, students may perceive a break in the continuum between their high-school education and undergraduate core. Those who teach undergraduate core math and science courses should examine whether inquiry-based instruction might work there, too. Such a change may help retain the interest of science and non-science majors alike.

RONALD M. LATANISION  
Chair  
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Secondary Education  
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### STRONG HAND OR HANDS OFF?

What Robert M. White calls the Coalition for the National Science Foundation in "The Science Advocacy Dilemma" (*TR May/June 1996*) is actually the Coalition for National Science Funding. Founded in 1988, it now consists of a broad spectrum of almost 80 groups sharing a concern for the future of sciences, mathematics, and engineering in the United States. In that spirit, we support increasing the nation's investment in the National Science Foundation's (NSF) research and education programs.

But we have never, as White implies, advocated earmarked funds. Instead, for the past two years, the coalition has sponsored an annual exhibition that highlights the results of NSF-supported projects and thus the funding appropriated by Congress. This year's event showcased nearly 50 projects and was attended by

more than a dozen members of Congress and 100 congressional staff members.

With the American political system attuned to group advocacy, those representing scientists are simply participating in the process. In these days of scarcer resources, we can do no less.

HOWARD J. SILVER  
Chair, Coalition for  
National Science Funding  
Washington, D.C.

In "Why We Need the Feds" (*TR April 1996*), Bennett Harrison offers reasons why "the federal government must maintain a strong hand in the nation's economic development." But his arguments are weak. First, he mistakes the stated goals of federal oversight and investment programs for actual results. He then suggests that a homogenous economic scene is preferable to regional hot and cold spots. But regional differences are inevitable because they are the result of a free society generating and testing economic ideas, and because our national economy is too large for the kind of federal intervention required to keep these imbalances from developing. Finally, Harrison's statement that local governments are much more reluctant to evaluate the cost-effectiveness of their programs than the federal government is unsupported.

KEN DURHAM  
Houston, Tex.

### LIFE IMITATES ART

Reading about titanium dioxide's stain-repelling properties in "A Self-Cleaning World" (*Trends, TR February/ March 1996*), reminded me that life does indeed imitate art. In the 1952 British comedy *The Man in the White Suit*, the hapless inventor, Alec Guinness, developed a self-cleaning fabric that threatened England's textile industry. However, unlike the movie, which portrayed labor unrest, entire industries are unlikely to be rendered superfluous by titanium dioxide's interaction with objects such as tile and glass (unless we count cleaning people).

JONATHAN S. HUDSON  
La Luz, N.Mex.

Continued on page 64

# PROTEAN

pro•te•an, adj. 1: exceedingly variable.

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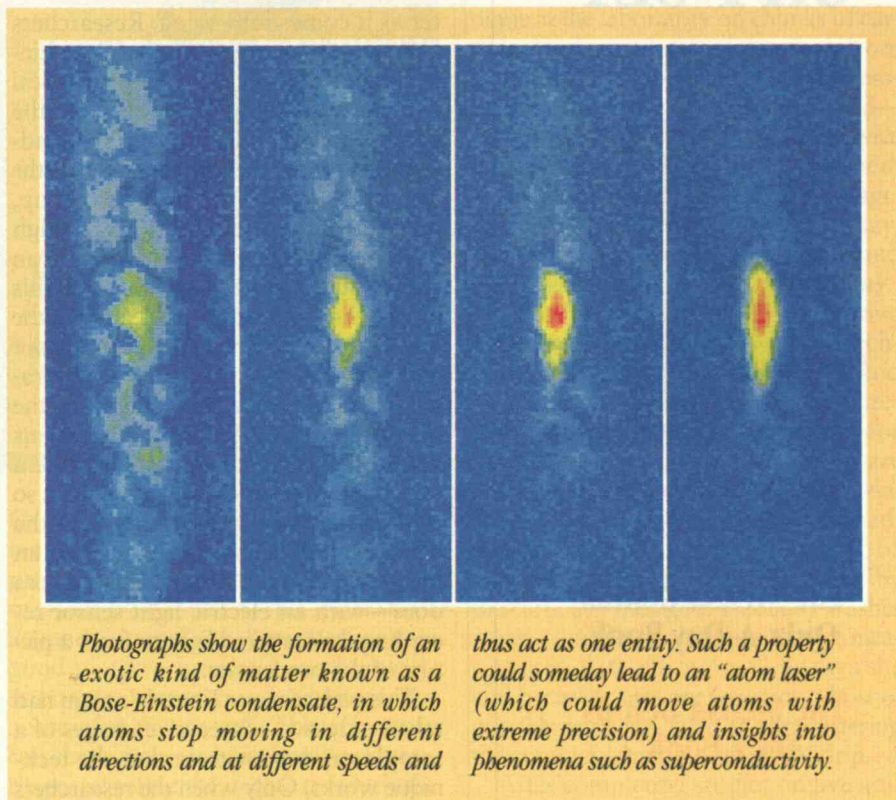
## COOL ATOMS

 In the summer of 1995, atomic physicists became a little giddy over a glowing blob. Visible on a video screen, the blob heralded the presence of a long-sought form of matter called a Bose-Einstein condensate. In this mysterious entity, atoms develop a sort of identity crisis, giving up their individuality as disparate units—moving in different directions at different speeds—to instead act as one. Researchers worldwide knew that such a property could eventually have applications in more accurate atomic clocks and even an “atom laser.” This dreamed-of device would employ atoms much the way a laser uses particles of light, and so could be useful for moving other atoms around with extreme precision—to make, for example, even more intricate patterns on semiconductors than is possible today.

Eric Cornell and Carl Wieman of JILA (formerly the Joint Institute for Laboratory Astrophysics) in Boulder, Colo., achieved the breakthrough, but among the rejoicing researchers was Wolfgang Ketterle, an assistant professor of physics at MIT. Although he'd been beaten by the Colorado team in the race to develop the condensate, he has since developed techniques for yielding impressive amounts of the exotic stuff, a critical step for studying it.

Scientists have been intrigued with the notion of a Bose-Einstein condensate and its properties since 1925, when Albert Einstein, building on work by Indian physicist Satyendra Nath Bose, predicted the existence of the unusual state of matter. His theory was that when atoms in a gas cooled almost to absolute zero came to a virtual standstill, if they were close enough together their waves should overlap and merge until the atoms would finally move in the same direction at the same speed, becoming a new phase of matter altogether. This came to be known as a Bose-Einstein condensate.

To test the theory, over the past decade researchers devised a way to create such an entity—a process that in-



volves chilling atoms to extremely low temperatures and corralling them with magnets in a trap. Physicists first beam laser light of a particular frequency at atoms of a gas. Those atoms happening to move toward the photons absorb them upon impact for a few billionths of a second before spitting them back out. In the process the atoms lose some heat to the photons. This in turn slows the atoms' forward momentum, lowering their temperature in the process. Physicists then further chill the atoms through evaporative cooling—a process similar to the way hot coffee cools, with the warmest, fastest molecules jumping out from the surface so that the average temperature of what remains in the cup drops. Finally, only the coldest, slowest atoms are left in a trap. Magnets herd the chilled atoms toward the center, increasing the gas's density.

Early designs had a fundamental flaw: a “hole” near the center where the magnetic field was essentially zero. Thus the atoms, which need a magnetic guiding

field to be trapped, could slip out.

The Colorado team's technique to solve the problem—a rotating magnetic field—worked reasonably well, but could not completely confine the atoms. Then Ketterle's group devised a solution that does away with the issue altogether. The team uses a cloverleaf-shaped winding pattern for the coils that create the trap's magnetic fields. This design has a finite magnetic field everywhere, so the atoms stay correctly oriented and don't escape. Ketterle's group started using the new trap in March, which immediately produced condensates with 5 million atoms—10 times the previous record. And each condensate was produced 10 times as fast as in experiments by other groups. The result was “a dream come true,” Ketterle says—without further tinkering, the setup creates enough condensate so researchers can more readily examine the new material.

Ketterle has also found a way to repeatedly photograph the condensate, a useful technique for examining the mat-



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## MIT REPORTER

ter as it comes into being. Researchers had recorded single pictures of Bose-Einstein condensate by a common analytical technique: shining laser light at the entity's atoms and analyzing the shadows that formed behind them. But as the atoms absorbed light, they heated up, destroying the condensate. (Although absorbing photons cools the atoms at an earlier stage, it heats them up at this stage, when each atom is so cold that the tiny kick it experiences upon spitting out a photon can raise the atom's temperature.) Ketterle realized that adjusting the light frequency beamed at the atoms would make the condensate act like a lens, scattering almost all the photons so that they do not significantly heat the condensate. His new system forms an image much as a traditional camera does—with an electric light sensor recording the scattered light to form a picture of the condensate.


This past summer Ketterle's team had taken only two consecutive images of a sample, to demonstrate that the technique works. Only when the researchers used 100 times more light than they needed to form an image did they see significant heating of the condensate. This means that as many as 100 pictures could be made without destroying the condensate, says Michael Andrews, a graduate student in physics.

Studying such "movies" should help in better understanding of the condensate's behavior. And that may lead to insights about other phenomena in which particles, like those in the condensate, act with unnatural orderliness: superconductivity and superfluidity. In superconductivity, current flows without resistance—a property potentially useful for faster computers and more efficient generation and transmission of electric power. In superfluidity, a fluid streams without slowing down.

What intrigues Ketterle most is that a Bose-Einstein condensate is "a novel form of matter with many unknown properties." The excitement in exploring it, he says, is "the hope of finding something completely unexpected."

—NANCY ROSS-FLANIGAN

## A WINDOW ON ARTHRITIS

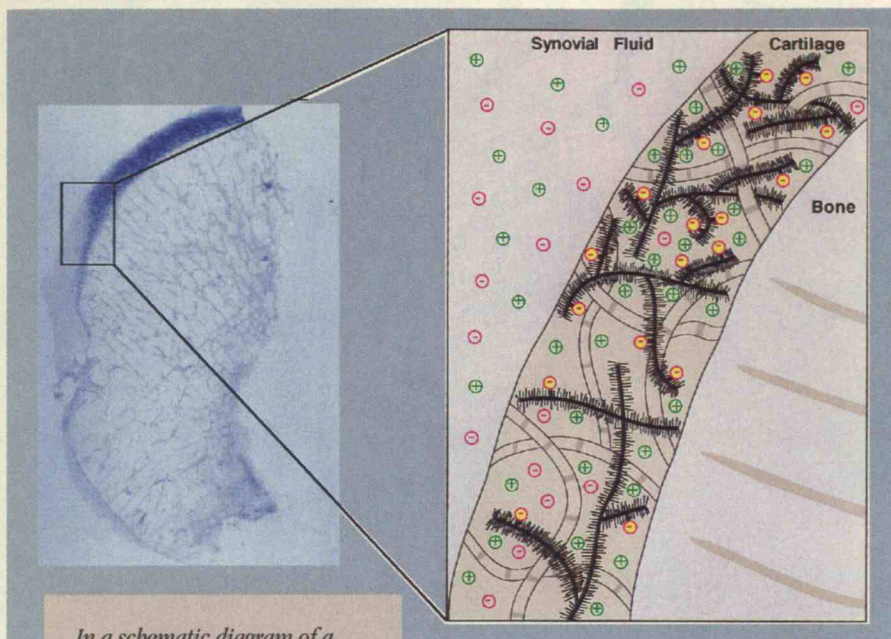
 Arthritis is one of the most common ailments, afflicting some 30 million Americans, yet it is also one of the most mysterious. The end point—the pain, stiffness, swelling, and gnarling of joints—is only too well known. But nobody really understands why cartilage in the joints becomes inflamed or how it breaks down. There are no cures and no surefire preventives. Treatment still relies heavily on aspirin.

The reason so little is known about arthritis is that the destruction goes on under layers of body tissue, unnoticed for years until the symptoms become severe enough to require medical attention. No imaging technology has been able to reveal the subtle changes in tissue that occur in the early stages of the disease. "At the moment, I can't tell you whether your cartilage is truly intact without taking your joint apart," says Martha Gray, an MIT professor of electrical engineering who serves as interim director of the Harvard-MIT Division of Health Sciences and Technology.

With any luck, though, Gray will soon be able to track the progression of arthritis through less drastic means. She and two collaborators—Deborah Burstein, a professor of radiology at Boston's Beth Israel Hospital and Harvard Medical School, and Adil Bashir, an MIT graduate student in electrical engineering—are developing a noninvasive imaging technique that should allow them to "watch the disease happen," as Gray puts it. More important, the technique may finally provide a reliable way to test the effects of various treatments, such as exercise and different types of drugs. The key is the ability to measure concentrations of an important component of cartilage, a molecule called proteoglycan.

If you can walk, bend an elbow, or flex your fingers without debilitating pain, you have proteoglycan to thank. This is the gel-like material that gives cartilage 90 percent of its stiffness. The molecules, which resemble bottle brushes, contain negatively charged "bristles" that repel one another as if they were





*In a schematic diagram of a joint (right), the upper portion of cartilage contains more bottle-brush-shaped proteoglycan molecules, which provide much of the tissue's resilience. A new technique measures the concentration of the negatively charged molecules and hence the health of the tissue. The stained microscope slide (left) shows the portion of the tissue represented in the diagram.*

tiny magnets laid negative pole to negative pole. So when cartilage is stressed, the molecules resist compression, greatly adding to the strength of the tissue.

Proteoglycan is also the material that goes missing when arthritis strikes. Although the precise mechanism is unclear, it is thought that enzymes produced in the body damage the spongy matrix that contains the proteoglycan molecules. In osteoarthritis—the form of the disease that is most common among older people—the enzyme attack may be a response to injury or repetitive strain. In rheumatoid arthritis, which affects a younger population, the enzymes may be unleashed by an overzealous immune system. Either way, the matrix is evidently loosened, and the proteoglycan gel gradually seeps away. The spongy material left behind, collagen, becomes pitted and frayed, and may eventually erode down to the bone.

The imaging technique designed by

Gray, Burstein, and Bashir uses nuclear magnetic resonance (NMR) to detect proteoglycan in cartilage. “If you can measure how much of this molecule is around,” says Gray, “you have a very good window into how mechanically strong the cartilage is.” NMR cannot accomplish this directly. The technology can show the anatomical outline of cartilage, revealing the degree to which the tissue has worn away. But, says Gray, “by the time you’ve actually eroded the cartilage, the disease is in a relatively late stage.” The health of cartilage depends on its composition, not just its anatomical shape.

To measure the concentration of proteoglycan, Gray and her collaborators take advantage of the molecule’s negative charge. By infusing cartilage with another negatively charged substance—in other words, a material that is repelled by proteoglycan molecules—the researchers have only to measure how much of this substance is absorbed by the cartilage to gauge the concentration of proteoglycan. The greater the absorption, the less proteoglycan is present. The substance they have chosen is a gadolinium compound that is ordinarily used as a “contrast agent”—a material readily imaged by NMR and routinely injected into patients to make physical features easier to see. The agent, Gray says, “just happens to be charged,” making it an ideal detector for proteoglycan.

The researchers have tested this tech-

nique in the laboratory on chunks of cartilage and on whole joints taken from animals. They are pleased with the resolution of the images they have obtained—ranging from about 25 microns, or twice the size of a cell, to 200 microns, or about a quarter of the thickness of cartilage. “That’s small enough for me to say, ‘Here’s where there is degradation, and here’s where there is none,’” says Gray.

Before it can be useful for monitoring arthritis over time, however, the technique must prove feasible on live, and ultimately human, joints. Here the researchers will need to compensate for the body’s natural dynamics. Joints are bathed in a nutrient solution—synovial fluid—that is constantly replenished. Although the contrast agent can be injected into this fluid and absorbed by the cartilage, the agent gradually washes away, complicating the business of measuring its concentration. Gray says she and her associates are weighing a host of possible remedies, such as administering the contrast agent in a steady IV drip.

After completing studies on live animals—a process she and her co-workers are just beginning—Gray hopes to collaborate with pharmaceutical companies on evaluating some of the drugs that have been proposed for treating arthritis. Various approaches are under study, such as inhibiting the production of certain enzymes or of interleukin-1, a substance that regulates the immune system.

Progress toward useful arthritis drugs has been hampered by the difficulty of measuring the effectiveness of treatment. To test an arthritis therapy, companies must now sacrifice large numbers of animals over long periods and attempt to draw general conclusions from a disparate sample of subjects. The ability to measure the health of cartilage in live individuals over time, Gray says, could improve the treatment outlook immeasurably. “We’ve proved the principle,” she says. “Now it’s a matter of reducing it to regular practice.”—DAVID BRITTAN

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# Trends

## Rails to Trails

It sounds implausible given the price of real estate and sheer lack of space in many suburbs and urban centers, but U.S. cities and towns have quietly added more park land over the past decade than at any time since the heyday of Frederick Law Olmsted's push to develop urban parks more than a century ago. The feat results from a novel idea upon which David Burwell and several colleagues founded a tiny organization 11 years ago: to turn some of the nation's abandoned railroad lines into recreational trails.

Abandoned rail lines have been commonplace across the country as rail use has continued to decline since its peak early in the century. But when Burwell's group—the Rails-to-Trails Conservancy based in Washington, D.C.—set up shop in 1985, seasoned activists and local officials alike doubted it could ever surmount the legal and political obstacles to reclaiming public access to these railbeds on a large scale. To be sure, railroad rights-of-way are notoriously complex arrangements among a daunting array of private, municipal, state, and federal owners. And no state or federal funds were available to help the group convert the lands.

Today, however, the Rails-to-Trails Conservancy, now some 70,000 members strong, reports locomotive-like momentum, having helped convert almost 8,000 miles of abandoned train lines into 800 recreational trails in all states except Hawaii and Delaware. Another 1,100 projects now in the pipeline promise to bring the total to 23,000 miles of linear park land in every state. Further, as part of the group's overwhelming success, a 1991 federal law—part of the Intermodal Surface Transportation Efficiency Act—now sets

aside federal matching funds to speed the development of recreational rail-trails.

Given that the thousands of miles of trails are some 12 to 15 feet wide and that rights-of-way are secured for at least three times that width, cities and towns across the country have already added a total amount of recreational land larger than many smaller national parks, such as Acadia in Maine and Bryce Canyon in Utah. And the scenic variety these trails offer is spectacular. The Boca Grande Path, for example, follows a 6-mile route along a barrier island off Florida once used to haul freight to ships docked at the island's south port. The Mount Lowe Railroad Trail winds up a mountain outside Los Angeles along what was once called "the railway in the clouds." And Seattle's 12-mile Burke-Gilman Trail, which links the heart of the city to wooded suburbs, is attracting such heavy use by commuters it has been likened to an "interstate for bicyclists."

Andrew Clarke, a staffer at the Rails-to-Trails Conservancy, notes that whereas the first trails often took years—even decades—of planning and development, newer trails are being inaugurated at a

*Some 8,000 miles of abandoned U.S. rail lines have been converted into biking and hiking trails, including Seattle's Burke-Gilman Trail (above), and Missouri's Katy Trail (right). Advocates of these "linear parks" hope to create a coast-to-coast route from a vast patchwork of discontinued lines.*



quicken rate. After seven years the group boasted 500 trails nationwide, but many of them took almost that long to establish. The total number of trails reached 600 some 20 months later, the next hundred trails took 14 months, and the most recent 100 came on line in just the last 10 months. "Our goal," Clarke says, "is to reach a total of 10,000 miles of rail-trails by the end of October 1997."

The pace at which so-called rail-trails or "greenways" are sprouting reflects their almost universal popularity: according to the National Park Service, which assists in planning and developing many of these areas, some 75 million walkers, joggers, bicyclists, equestrians, cross-country skiers, wheelchair users, skaters, and hikers are using the new rail-trails. For example, the Minuteman rail-trail,



which cuts an 11-mile swath through the historic Massachusetts towns of Arlington, Lexington, and Bedford, was originally conceived as a commuter bikeway. But after its completion in October 1992 following years of local effort, the trail became one of the nation's most heavily patronized recreational rail-trails with some 2 million users each year. Jerold Van Hook, chair of the volunteer organization Friends of the Minuteman Bikeway, reports that the trail now commonly accommodates upwards of 10,000 users on many weekend days.

### Boon for Business

Such popularity breeds a positive economic impact. According to data compiled by the National Park Service and the President's Council on Sustainable Development, the cost to convert and maintain rail-trails nationwide is often offset within a single year by higher sales in neighboring towns. Some restaurants and shops in downtown Lexington, for instance, attribute as much as a 30 percent increase in business directly to the Minuteman rail-trail.

In many smaller communities the impact is even more dramatic. More than a third of the downtown storefronts in Dunedin, Fla., had been boarded up before the Pinellas Trail opened in the

early 1990s. Today all the downtown stores are back in business.

"These recreational corridors are a wonderful reuse of an abandoned resource and a boon to communities across the country," says Steven Golden, a representative of the National Parks Service who helps develop and conserve New England trails. Clearly impressed, the Clinton administration honored the Rails-to-Trails Conservancy earlier this year with the first-ever Presidential Award for Sustainable Development.

In the early days, costs were borne by individual states. The Massachusetts Minuteman rail-trail, for instance, required \$2.7 million to create, most of which was spent to remove tracks and pave the trail. But some 540 projects have now been funded with federal assistance. Moreover, roughly a quarter of the nation's rail-trails have made arrangements with cable television and communications firms seeking uninterrupted rights-of-way to bury cable in exchange for help defraying the costs of building the trails, says Clark.

Despite their successes, Clark and Burwell maintain that their group has lots more trailblazing left to do. With the deregulation of the railroad industry in 1980, railroad companies are allowed to swiftly abandon any unprofitable rail line. Now with around 140,000 miles of track, the core railroad system of the future will contain just 100,000 miles of track, Burwell's group estimates. Combined with nearly 160,000 miles of already-abandoned lines, the consolidation will leave roughly 200,000 miles of track that could be converted to trails.

Much of the focus now, Clarke says, is on exploring possibilities for connecting the trails. Contiguous rail-trails already cross almost the full width of Washington state and Nebraska, while greenways along the East Coast stretch most of the way from Boston to Washington, D.C. Next on the agenda: exploring the feasibility of creating a seamless coast-to-coast rail-trail from the patchwork of abandoned rail lines that connect virtually every city and town in the country.—SETH SHULMAN

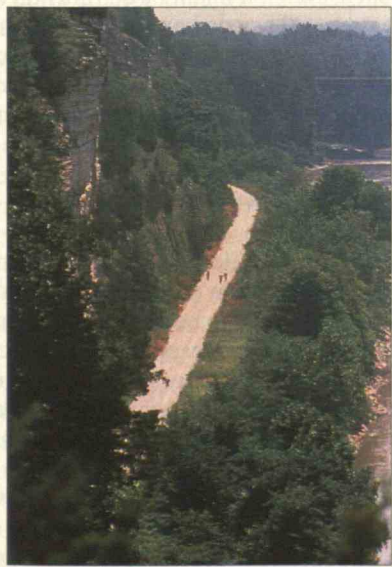
## Species Protection: New Incentives for Landowners

For six decades Ben Cone and his father before him have carefully tended their 8,000-acre coastal plain preserve in North Carolina. Periodically they'd set fires to cleanse the mixed hardwood forests of woody undergrowth and selectively cut timber to sell, thus creating meadows for browsing by wildlife. Deer, black bear, turkeys, quail, wood ducks, and doves have since flocked to the sprawling sanctuary that contains long-leaf pine forests, swamps, sandhill ridges, and a stretch of the meandering Black River. "It's lovely land, very interesting land," says Cone, proudly pointing out that one of the oldest trees found east of the Rocky Mountains, a 1,600-year-old cypress, grows on his property.

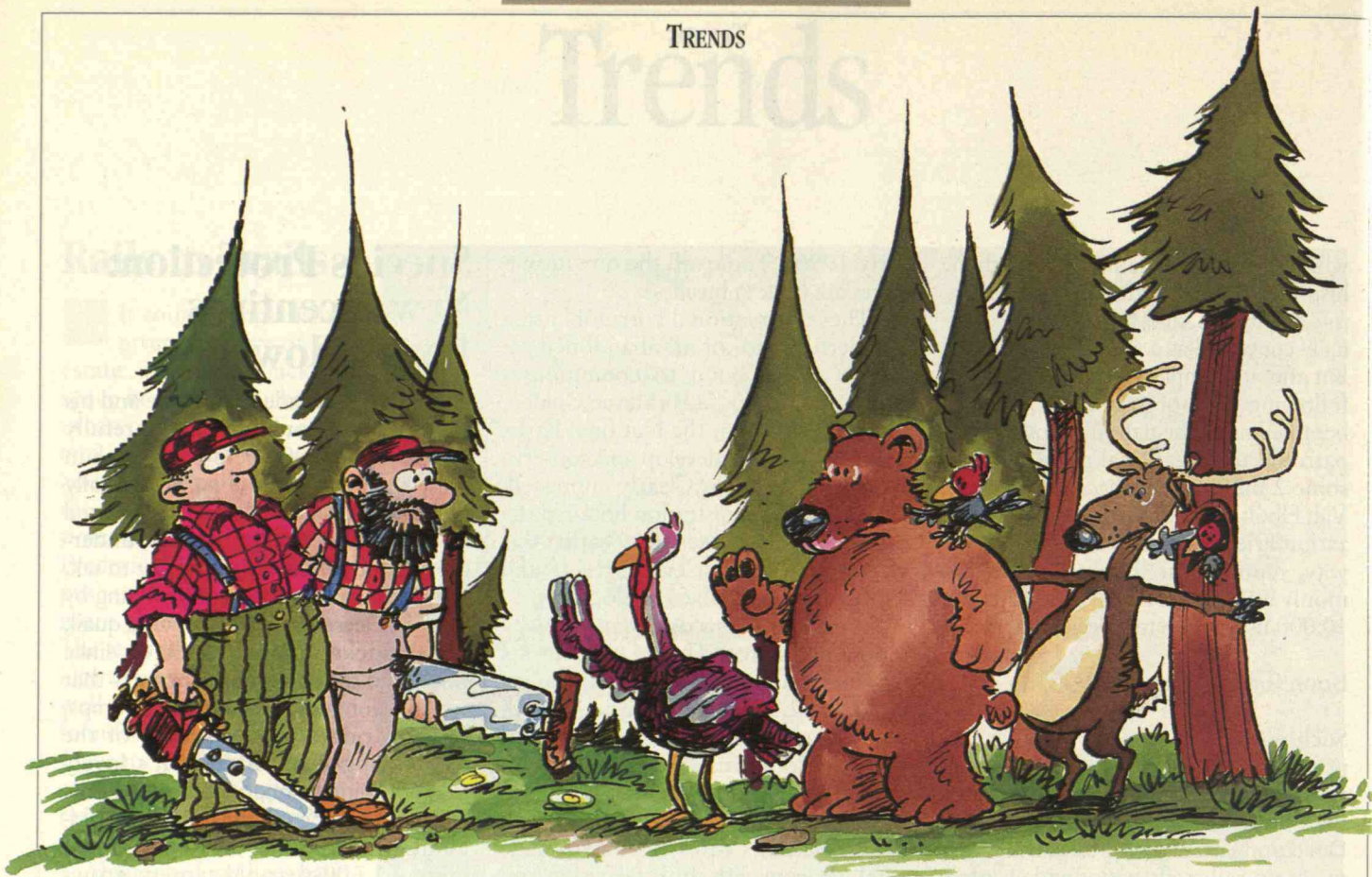
But the 8,000 acres have also created a conundrum for the North Carolinians ever since their gentle stewardship has lured an endangered woodpecker to their land. The species, the red-cockaded woodpecker, is protected by the Endangered Species Act (ESA). Envisioned in 1973 as landmark legislation that would reverse the decline toward extinction of fish, plant, and animal species, the ESA currently lists nearly 1,000 species as either endangered or threatened, and more than 400 "candidate" species are being considered for listing. But while the ESA's mission is noble, opponents contend it unfairly denies landowners the use of their property by dictating that neither the listed species nor their habitat be harmed.

Since the act's inception, listed species have halted timber sales, stopped housing developments, and stalled resort projects. And gray wolves, bald eagles, and grizzly bears have been blamed for livestock losses by ranchers who are banned by the ESA from poisoning or killing these protected predators.

Ben Cone's first brush with the ESA occurred five years ago, when 29 red-cockaded woodpeckers turned up on a







portion of his land. The woodpeckers, just over eight inches in length with a black-and-white striped back and splashes of red on the sides of their heads, are rather innocuous birds. Flitting from tree to tree to drill insects out of bark with their pointed beaks, they live in clusters, or colonies, of three or more birds and prefer old stands of long-leaf pines.

Because the ESA classifies red-cockaded woodpeckers as in danger of extinction, their presence has dictated Cone's decisions in overseeing his 8,000 acres. "I had 1,100 acres of mature timber that I couldn't cut under the existing [ESA] rules," sighs Cone, who figures the timber would have fetched \$1.5 million if harvested.

While he couldn't take a saw to those 1,100 acres without chancing a jail term, Cone was determined to prevent the woodpeckers from expanding their range on his land and began each year to clearcut between 200 and 300 acres of younger long-leaf pines surrounding the woodpeckers rather than let the trees age and become desired habitat.

While Cone's approach to wildlife management might seem extreme, like

others who fear the clout of the ESA he felt he had little choice. In fact, worries that ESA mandates will devalue land prices and, in some cases, make parcels undevelopable have led a number of U.S. landowners to go on the offensive against the act by ensuring that their land never shelters an endangered or threatened species in the first place.

So concerned that the lowly gopher tortoise would wind up on the ESA's list of threatened species and block their plans, developers in Florida, Alabama, Georgia, and South Carolina have poured cement into tortoise holes found on their land. In California, farmers have plowed under fields they normally would leave fallow rather than chance that endangered kangaroo rats might be attracted by vegetation. And in northwestern states, landowners have resorted to "panic cutting" of Douglas fir forests to prevent the endangered spotted owl from taking roost. Indeed, the ESA's lack of incentives, primarily financial, that might persuade landowners to be more species-friendly may be the law's Achilles' heel.

Fortunately, the U.S. Fish and Wildlife Service, which is responsible for admin-

istering the act on land, is working to make amends. One such effort has led to creation of the agency's Safe Harbor program, which requires landowners to maintain only a specific amount of habitat for endangered species. If good land-management practices expand the habitat, landowners holding a Safe Harbor agreement are not prohibited by the ESA from changing their management approach, even if it might be detrimental to the species. They do have to give the Fish and Wildlife Service (FWS) notice of their intent so the agency can either try to trap and relocate the species or purchase the land.

### Monetary Rewards

Defenders of Wildlife, a national non-profit conservation organization founded in 1947, has also been at the forefront of efforts to build incentives into the act. In the northern Rocky Mountains, the organization not only reimburses ranchers for livestock killed by gray wolves, an endangered species, but also offers a \$5,000 "reward" to ranchers who allow wolves to den on their land.

Three years ago, the organization



issued a report on other possible incentives that could work to reinforce the act, ranging from tax credits to actual compensation for landowners who protect ESA species and their habitat. Similarly, the Keystone Center, a nonprofit organization created to spur national and international consensus building on public policy, last year built on the Defenders of Wildlife report, issuing an equally detailed proposal on ways to build incentives into the act.

These proposals have led to a variety of amendments pending in Congress. One would exclude from estate taxes land protected by an endangered-species conservation agreement signed with FWS. Another would create an annual tax credit of up to \$50,000 for land managed to preserve endangered species. Still another would direct the U.S. Mint to sell a limited edition of commemorative gold and silver coins to generate money to help administer the ESA.

Pushing some of these measures is Sen. Dirk Kempthorne (R-Idaho), who believes incentives are the only way to convince property owners to willingly help conserve species. "Right now, the only tools that the act gives the federal government is the hammer of regulation," says Kempthorne's aide Mark Snider. "It says don't do this, don't do that, or we'll punish you. What we need to do is change that whole mentality, encourage cooperation, and say it's in your best interests" to preserve species.

While the prospects that Congress will succeed in passing one or more of these measures during this session are slim because of the lack of time and the focus on the presidential election, Cone believes Congress must act eventually if the ESA is to succeed. "It's a legal, moral, common-sense issue about who should pay the costs of protecting endangered species," he says. "If society says it's worth the cost, then society has to charge more in taxes, buy the land, and create endangered species parks. The burden should not fall on the individual landowner who just happens to get caught, either through good land management or bad." —KURT REPANSHEK

## Designer Sounds

There once was a simple rule regarding sound and automotive engineering: silence was golden. Indeed, this truism is the subject of an apocryphal story about a Rolls-Royce advertisement in the early 1960s in which the announcer proudly stated, "At 60 miles an hour, the loudest noise in the new Rolls-Royce comes from the electric clock." Upon seeing the ad, some smart-aleck Rolls engineer was reputed to have said, "It's time we did something about that damned clock."

Today silence, per se, is ceasing to be the preoccupation of carmakers. The new rallying cry is "pleasability." Decibel level alone, the thinking goes, does not tell designers whether a sound is pleasant or unpleasant to a potential customer. "I like to use the example of a mosquito in your bedroom compared to a gentle rain on your roof," says Gene Smiley, product manager with Structural Dynamics Research Corp. (SDRC), a producer of computer-aided design systems and sound-testing software for the automobile industry. "Both are quiet sounds, but one is extremely annoying and the other isn't."

A focus on pleasability has arisen in part because Rolls-Royce is not the only company that has mastered the art of silence. "You can make the engine quieter and reduce road and wind noise," says Scott Amman, a research engineer at Ford Motor Co. "But then other noises you never heard before crop up, such as the moving of seats or the raising and lowering of windows."

We hear such noises and expect them to sound a certain way, says Amman. For example, Ford has discovered that if the electric window opener "sounds as if it's going to die at the end—you know, if it gets running and then goes *naa-rung*—people don't like it," he says. "It may not be a quality issue, but they may perceive it as such."

So concerned are car companies

about psychoacoustics that most have devoted entire laboratories to what is formally termed NVH (noise, vibration, and harshness) but is more jocularly called BSR (bumps, squeaks, and rattles). Part of what these laboratories do is try to determine the parameters of pleasability. In fact, in the last four years, Ford alone has turned out psychoacoustic papers with such high-flown titles as "A subjective evaluation of automotive starter sounds" and "Sound quality analysis of vehicle wiper systems."



*Engineers using simulation software can determine how a car's sound will change when its components are redesigned or reconstructed. In this way, designers try to create sounds considered most pleasing by consumers.*

Before the labs were established, test subjects went directly to the cars to listen to sounds. However, research indicated that their perceptions were often clouded by other issues. For example, many people tended to judge expensive car sounds to be more pleasing than inexpensive car sounds simply because they came from a higher-priced vehicle.

Test subjects are now placed in a laboratory and given what amounts to a



blind taste test. In one part of the testing they hear two sounds and are asked to judge which is most pleasing. In another test they are asked to rank each sound's pleasability on a sliding scale, from extremely smooth to extremely rough, or from extremely soft to extremely loud.

Once engineers identify what most subjects determine the most pleasing sounds, they can use sound-simulation software such as that from SDRC to fine-tune a given component accordingly. Say the subjects determine that the exhaust system for a particular car should have a distinctively sporty sound during rapid acceleration. Using an array of microphones attached to a prototype model, acoustics engineers would first record the vibrations produced at numerous locations, which together create the exhaust system's overall sound.

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That information would then be merged with a computerized model of the exhaust system in the SDRC sound simulator so that as engineers change the size, shape, and thickness of the exhaust components as well as the location of the support brackets, the simulator computes the vibrational changes and synthesizes the corresponding sound.

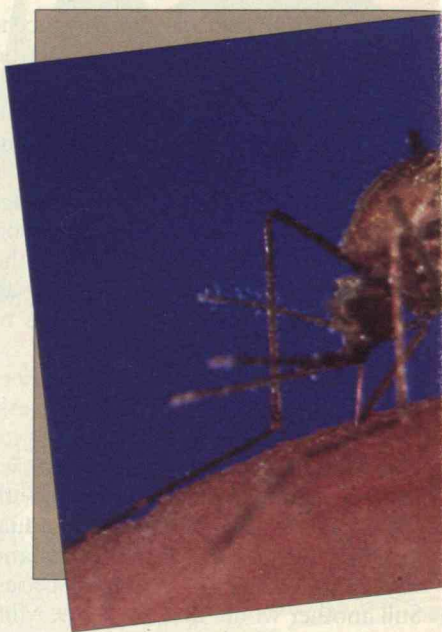
"By manipulating the design parameters of a component," says Smiley, "you can eventually zero-in on the sound you want." In fact, Japanese designers used such an approach to engineer the signature exhaust sounds of 1950s and '60s British sports cars, such as the MG and the Triumph, into the Mazda Miata.

Despite its sophistication, however, the process is not an exact science. What can drive engineers crazy, Smiley says, is that "solutions are often counterintuitive." For example, he says, installing a rib to make a structure stiffer to reduce vibrations that cause noise might instead increase radiated sound.

What also remains hard to predict is how two individual sounds—which themselves might not be unpleasant—can interact. For example, two vibrations in tandem "might create a beating noise, sort of a *waa-waa-waa* sound," explains Amman. Ford engineers discovered that spacing the blades of a cooling fan asymmetrically put a stop to one such unintentional beat.

Finally, modern car design is creating its own set of noise problems. Snap-on plastic parts, including those forming the trim around radios, doors, and ceilings, eliminate fasteners but are often looser and tend to vibrate more. These vibrations are likely to get worse over the years as the plastic stretches or "creeps." To help them avoid such problems when designing components, car manufacturers are devising computer models that attempt to determine not only how much noise the vehicle will make at purchase but also how much it is likely to make as it ages.—STEPHEN STRAUSS

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## Malaria-Proof Mosquitoes

Medical researchers have long been thwarted in their efforts to design a vaccine against malaria, the insidious mosquito-borne disease that each year infects 300-500 million people, mainly in Africa, Asia, and South and Central America, and causes some 2 million deaths. Once the malaria-causing parasite is passed from the mosquito's saliva into the human bloodstream, it changes form several times inside the body, making it an elusive target for the immune system.

Now, molecular biologists are pursuing a radically different approach: vaccinating mosquitoes rather than people. The novel scheme entails using genetic-engineering technology to give mosquitoes a gene that will produce an antibody that will in turn kill the parasite inside its stomach. "In effect, we'd be giving the mosquito an immunity to the malaria parasite so that when a mosquito bit someone, there would be no parasite to inject to cause disease," says Jane Burns, a molecular biologist at the University of California at San Diego.

This spring, Burns took a crucial step





*Having discovered a novel way to genetically engineer insects, researchers hope to render the African *Anopheles gambiae* mosquito (above) incapable of carrying a parasite that causes malaria in humans.*

toward that goal by altering a virus so that it could attach to mosquito cells and deliver a genetic payload to the genes inside. She and her team began working with a virus that was adapted in the 1980s as a so-called vector for delivering genes to humans. The vector, originally a virus that caused leukemia in mice, had been rendered harmless when it was stripped of coding sequences that allowed it to reproduce. The hollow virus was an effective delivery vehicle, however, because it retained its ability to attach to and penetrate mammal cells.

What Burns and coworkers accomplished was to adapt the vector, which normally seeks out proteins on mammal cells, to attach to lipid, or fatty, structures on the surface of insect cells. To test the new vector's delivery capabilities, Burns collaborated with Frank Collins, a biologist at the Centers for Disease Control in Atlanta, to inject a test gene that provided resistance to a toxin into live mosquitoes. They are now working to get that gene into cells in mosquito

embryos that will mature into sperm and egg cells in adults, so that the trait could be passed on to subsequent generations as a permanent part of the mosquitoes' genetic inheritance.

Having proven the technique with the test gene, Burns and Collins are now preparing to arm the virus with a gene originally designed for a possible human vaccine against a strain of malaria prevalent in Africa. The gene, developed by Angray Kang, a molecular biologist at Scripps Research Institute in La Jolla, Calif., produces antibodies that attack the malaria parasite, *Plasmodium falciparum*, carried by the *Anopheles gambiae* mosquito as it nestles in the insect's stomach.

Once researchers succeed in arming mosquitoes with a gene vigilant against disease, still another hurdle remains: replacing untold billions of the indigenous mosquitoes with these genetically tailored lines. Such transformations have never been achieved by scientists through genetic engineering, but they have occurred in nature, says Michael Turelli, a population theorist at the University of California, Davis.

Turelli cites the case of a type of fruit fly that was shown to have gained a reproductive advantage from a bacterium that resided in it. When it moved into a new area and mated with indigenous fruit flies, only those offspring that carried the bacterium were fertile. Indigenous male and female mosquitoes could still produce fertile progeny, but when the product of mixed breeding failed to contain the bacterium, that line quickly died off. As a result, several months and some 20 generations later, the bacteria-bearing flies represented 80 percent of the entire population.

Likewise, some idiosyncrasy in the biology of mosquitoes might give one group a survival advantage, says Collins, though until now no one has had strong reason to pursue such research.

Besides perfecting the gene-delivery technique and devising a means to replace indigenous populations with genetically altered mosquitoes, scientists would likely be required to conduct tests

in a contained environment, such as an island, to see how introducing a malaria-resistant mosquito might affect other parts of an ecosystem. Burns maintains, however, that because the African strain of malaria is transmitted between people and mosquitoes, it would be unlikely that the genetically altered mosquitoes would have any detrimental effect on the environment.

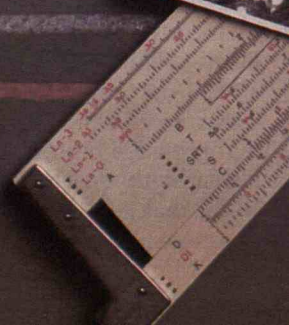
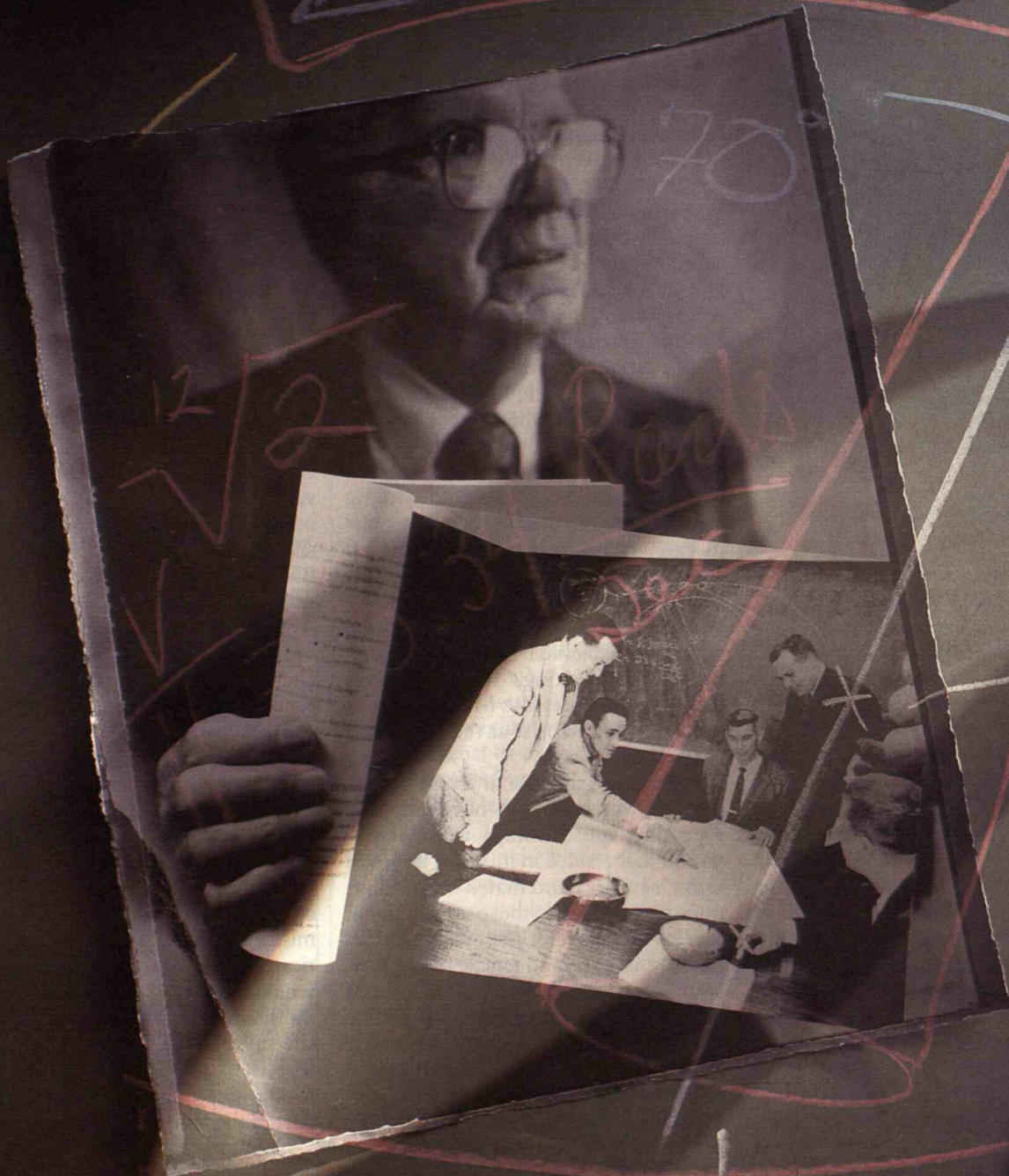
### Flying Vaccines

Given these challenges, it may be a decade before such genetically altered mosquitoes would be ready to be released over an entire continent, says Collins. Meanwhile, scientists are pursuing similar interventions to combat other diseases. Biologists at the University of Alabama are testing whether Burns's viral vector might be effective in delivering genes to black flies that cause river blindness. And researchers at Colorado State University are developing alternate gene-delivery techniques to prevent mosquitoes from carrying the parasites that cause dengue fever and yellow fever.

Burns thinks that eventually the transgenic mosquitoes could be one of the most effective and elegant medical tools available to developing countries, where medicines and vaccines are often too costly, too difficult to distribute, and misused. "This is a complex and sophisticated First-World technology that would require minimal infrastructure in the Third World where you'd apply it," she says. In the bush of Africa or the forests of Latin America, the genetic technology might someday become a part of the natural landscape.

Ultimately, mosquitoes might also be engineered to carry vaccines against diseases such as measles, polio, meningitis, and tetanus, Burns adds. In this scenario, when a mosquito bit someone, it would inject a molecule contained in its saliva that has the shape of the agents that cause those diseases, thus provoking an immune response. A prick by the mosquito would provide the same effect as a doctor's syringe.—DAVID GRAHAM







# Code Name: CORONA

By Seth Shulman

## **T**he weekend before Thanksgiving

in 1959, Walter Levison, project manager on a top-secret U.S. spy-satellite program, drove to meet renowned inventor Edwin Land at his summer home in Peterborough, N.H., to deliver the bad news. Levison, who remembers it as the blackest moment of his life, didn't mince words. The highly classified government program was on the

ropes, beset by seemingly insurmountable technical problems. Land, developer of instant photography and the head of an intelligence advisory committee that was secretly guiding the project, would have to relay word to President Eisenhower that the program would need to "stand down." ♦ "It's hard to imagine the pressure we felt,"

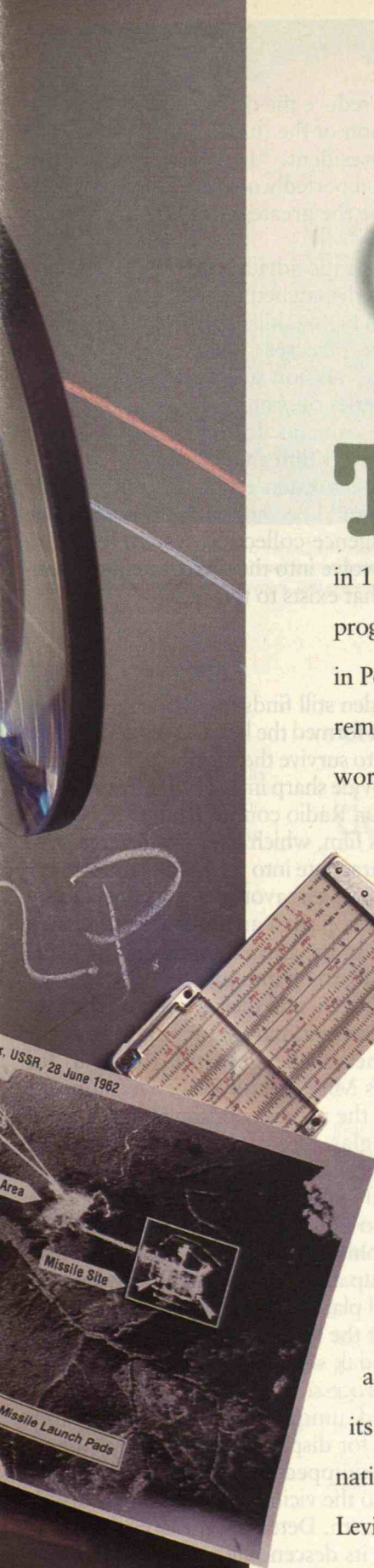
says Levison, now 77, furrowing his thick gray eyebrows. In that brief exchange on that bleak New Hampshire day, he felt like he was letting the country down, much to his humiliation and frustration. So with Land's approval Levison decided that the team would redouble its efforts for three months in one last push to launch the nation's first spy satellite into space. ♦ In those next months Levison and his chief engineer Frank Madden would often sleep in the

**As its engineers can now finally recount after decades of secrecy, launching the world's first spy satellite was no small technological feat. And their efforts changed the course of world events.**



ILLUSTRATION BY DANA SIGALL

FRANK MADDEN HOLDS A PHOTO OF HIS TEAM AT WORK ON THE CORONA PROJECT IN THE 1950S.







milk factory in Needham, Mass., that, under the innocuous sign of the optical firm Itek, concealed the secret project. "During that period we hardly ever left the laboratory," Madden recalls. "People were working around the clock." Neither man could ever explain to his family why he spent so many nights and weekends away.

The program was forging ahead amid an air of near desperation over the Soviet Union's perceived lead in space after the launching of Sputnik, the world's first satellite, in 1957. "As it beeped in the sky," Eisenhower's science adviser James R. Killian would write later in his memoirs, "Sputnik created a crisis of confidence that swept the country like a windblown forest fire." Bellicose as ever, Edward Teller, father of the recently developed hydrogen bomb, maintained on television that, by falling behind the Soviets in space, the United States had "lost a battle more important and greater than Pearl Harbor."

"Faith in American technological superiority has been shaken," *Newsweek's* cover story announced as it trumpeted a new age of vulnerability. Indeed, while many people were preoccupied with Sputnik, Eisenhower and his advisers worried more about the powerful SS-6 launcher that had flung the satellite into orbit. The Soviets could clearly use the same launchers to send a ballistic missile hurtling thousands of miles. And, sure enough, the Soviets soon demonstrated this very capability months later in August of 1957, testing an intercontinental ballistic missile believed to rival U.S. missiles.

To reduce fears on both sides, Eisenhower had proposed a sweeping Open Skies plan in 1955 that would allow overflights of military installations inside the superpowers' borders, but Soviet Premier Nikita Khrushchev had curtly rebuffed him. Now, two years later, as fear of Soviet intentions grew, Eisenhower made gathering information a top priority. "The country was starved for intelligence on the Soviet Union at that time," Levison says. "Very little information was coming out." The government's vaunted U-2 high-altitude spy plane could provide only narrow "spot" reconnaissance of known targets, and President Eisenhower saw it as a risky tool even before the Soviets shot down Gary Powers's mission over USSR territory in 1960.

At this pivotal moment Land's high-level advisory panel had thus persuaded Eisenhower of the need for more photographic surveillance. "We must find ways to increase the number of hard facts upon which our intelligence estimates are based, to provide better strategic warning, to minimize surprise in the kind of attack,

and to reduce the danger of gross overestimation of the threat," the panel urged the president. "If we are successful," Land reportedly assured Eisenhower, "it can be the greatest intelligence coup in history."

Taking the advice to heart, the administration dispatched Levison and Madden as part of a highly skilled network of teams to tackle the top-secret project code-named

Corona. The teams' mission was unprecedented: to build and launch a series of orbiting satellites equipped with high-resolution cameras designed to photograph Soviet territory and eject film canisters to earth undetected. And the mission's results endure: the supposedly temporary Corona would become the backbone of the government's intelligence-collection system for more than a decade, and evolve into the secret satellite reconnaissance program that exists to this day.

### Feverish Origins

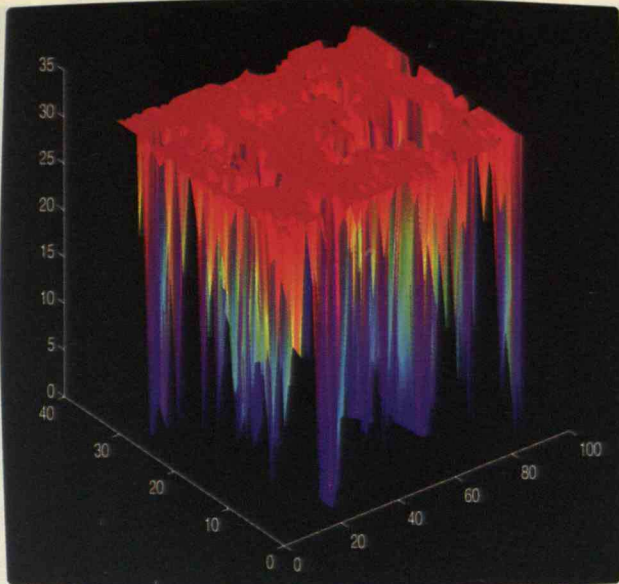
Looking back, Madden still finds the challenges daunting. The cameras that formed the heart of the project had to be rugged enough to survive the shock of a launch and steady enough to provide sharp images while traveling at 17,000 miles per hour. Radio control from earth would advance the camera's film, which then would eject from the spacecraft and parachute into the earth's atmosphere for retrieval. And—Madden savors it like a punch line—the teams had to develop such an audacious system at a time when no one in the United States had yet succeeded in launching anything into orbit.

While Levison, Madden, and their team forged ahead on developing the camera, parallel teams across the country tackled other challenges. In California, for example, Lockheed's Missiles and Space Division was attempting to build the actual orbiting vehicle, code-named Agena. Douglas Aircraft was responsible for modifying Thor rockets, developed initially as intermediate-range ballistic missiles, for the job of thrusting the Corona satellites into polar orbit—selected to provide maximum photographic coverage as the earth turned on its axis. A secret group at General Electric provided the recovery vehicle, gold plated as a shield against radiation and insulated against the heat of reentry into the atmosphere. Eastman Kodak supplied a novel form of film and performed the processing.

Each group faced unique challenges. The film-retrieval plan called for dispatching a squadron of six cargo planes, each equipped with a trapeze-like loop hanging beneath it, to the vicinity of the ejected capsule as it parachuted to earth. Detecting the capsule's radio beacon and sighting its descending orange canopy, the pilots would fly the cargo planes across the top of the parachute and hook onto it while crew inside the plane's

*SETH SHULMAN, a contributing writer for Technology Review, has also written for Smithsonian and the Atlantic. He is the author of The Threat at Home: Confronting the Toxic Legacy of the U.S. Military (Beacon, 1992).*





This surface plot shows impact damage to a rectangular section of helicopter laminate material. Algorithms developed with the MATLAB Neural Network Toolbox classify echoes from ultrasonic signals to automate non-destructive inspection. Data courtesy of McDonnell Douglas under an AATD contract.

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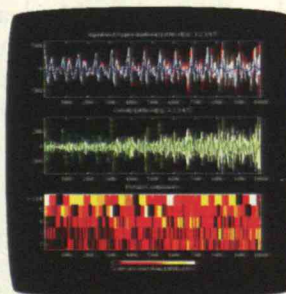
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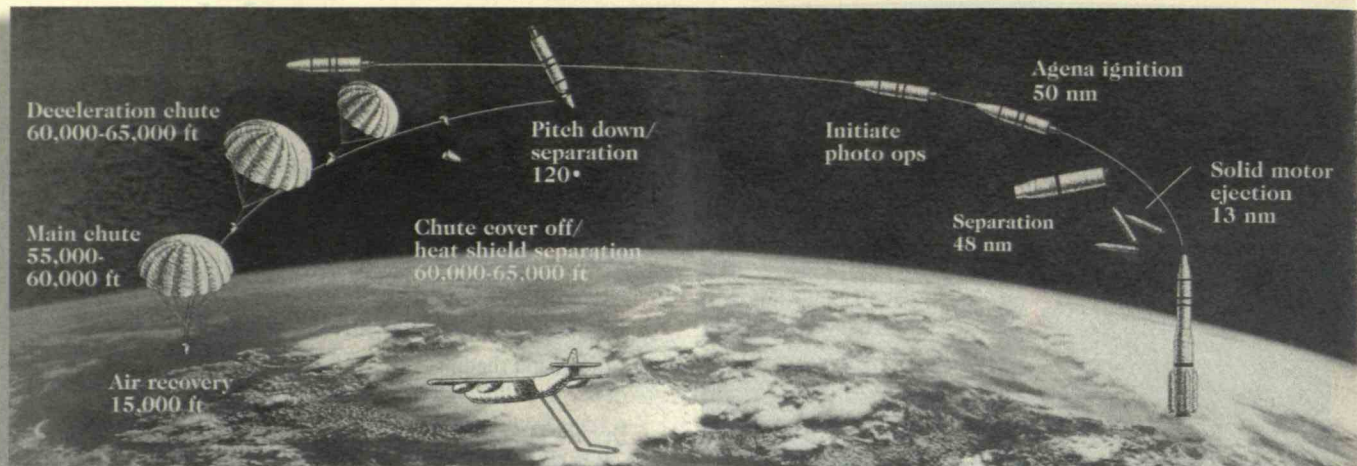
MATLAB Wavelet Toolbox algorithms perform a 5-level decomposition of a voice signal. Data courtesy U. S. Robotics Mobile Communications Corp.

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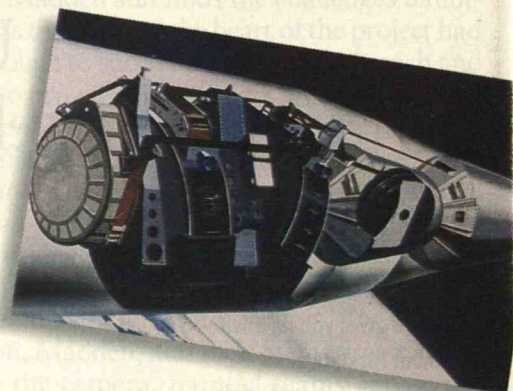
bay yanked the capsule aboard with a winch. If the airborne feat failed, Corona's recovery vehicle was designed to float long enough for recovery from the ocean by helicopter launched from a nearby ship.

At the time of Levison's visit to Land, the project had met with seemingly unending frustrations during a year of breakneck work. Despite numerous unsolved problems, the program had recently attempted eight launches, as though engineers were trying to will the complex new technology into orbit. All eight attempts to launch a functioning spy satellite had failed. Four did not even achieve orbit. One craft that did blew up as it tried to eject the film capsule, and all the other capsules were either destroyed or lost through major mishaps. And, as on-board instrumentation revealed, none of the Levison team's cameras functioned for more than a few brief moments before the embrittled film cracked—as team members would curse it—“like autumn leaves” in the low-temperature vacuum of space. Indeed, although no one, least of all Levison, wanted to admit defeat, the cracking film problem was so vexing that it threatened to derail the whole venture.

### Back from the Brink

In fact, driving back from New Hampshire to the secret lab in Needham, Levison could scarcely dream that just nine months later, on the fourteenth attempt, a satellite would finally pierce the Iron Curtain. Successfully ejecting film containing images of some 1.5 million square miles of Soviet and Eastern European territory, the first

**D**eveloping a camera system (bottom, right) that could produce high-resolution photographs of Soviet territory in the cold vacuum of space proved a formidable challenge. The system was designed to eject the film canister from a satellite as it orbited the earth (above), for retrieval in mid-air by a cargo plane (middle).




satellite would offer more coverage than four years of flights by the nation's high-flying U-2 spy planes, thus providing vital intelligence information about the USSR's nuclear arsenal. The Corona program would, in fact, turn out to be not just the first but also the longest and arguably the most successful space program in the nation's history.

Ultimately some 121 Corona satellites would orbit the earth between 1960 and 1972, taking some 800,000 pictures on 2.1 million feet of film. And image resolution became acute: prints could clearly depict a 5-foot object on the ground. Only the advent of satellites relying on digital video technology that could beam high-resolution visual data to earth in real time would displace Corona's photographic system.

Fortunately, as engineers just entering their prime, Levison and Madden didn't know enough to be scared away by the challenges they faced. But they did know their respective fields. Levison had been fascinated by photography ever since he was a kid growing up in New



A black and white photograph of a woman with her eyes closed, holding a clear blue plastic jar up to her face as if smelling it. The lighting is dramatic, with strong shadows on her face.

Pam Jones is a chemical engineer, mother of two, nature lover and part of a team that pioneered a revolutionary regeneration process called Petretec<sup>SM</sup>. It takes used polyester plastic, unzips the molecules and allows it to be reused, good as new. An everyday jar can become a videotape, then a seat belt, then a designer shirt. "Evergreen polyester," Pam says, "the cycle continues on and on."

She can turn this jar into a designer shirt.

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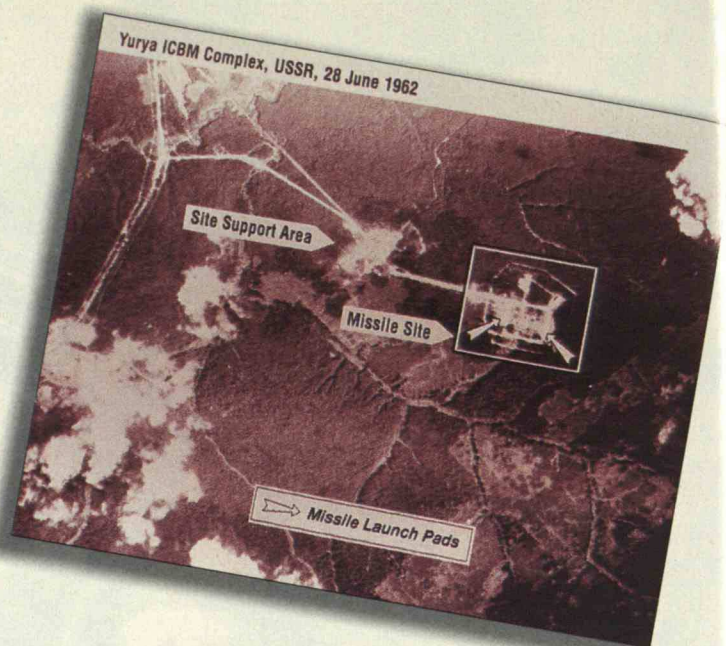


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**P**resident Eisenhower announces the first successful return of a capsule from space (above) as part of the "Discovery" exploration program—actually a cover for the Corona spy effort. Corona's hundreds of thousands of photos gave U.S. officials detailed information about the Soviet and Chinese nuclear programs. Left to right: The Yurya ICBM complex in 1962; the Sary Ozek missile complex in 1971; China's Lop Nur test site in 1964.



York City. He then served with a photo reconnaissance unit in World War II, taking pictures of Japanese troop movements, and he had even helped document the open-air nuclear test at the Bikini atoll in 1950 while circling in an airplane some five miles away.

Levison's early

work on an Air Force balloon project called Moby Dick—a secret effort supposedly to study weather patterns but really designed to spy on the Soviets—had taught him about long odds and perseverance. When engineers tested the balloons in the United States, mysterious sightings across the Southwest fueled a huge UFO scare, but officials refused to talk about the program even while cordoning off areas to search for fallen capsules. Desperate for evidence of activities within Soviet territory, the Air Force launched 516 camera-toting balloons from Turkey and other sites in Western Europe yet recovered only 44, of which 40 produced photographs. Most landed within the Soviet Union, with some ending up on display as evidence of hostile U.S. intent.

Frank Madden, chief engineer and later project manager of Corona, was the original pocket-protector type. As an engineer on a balloon reconnaissance project briefly directed by Levison at Boston University, he too had pioneered efforts to gather crisp images from high

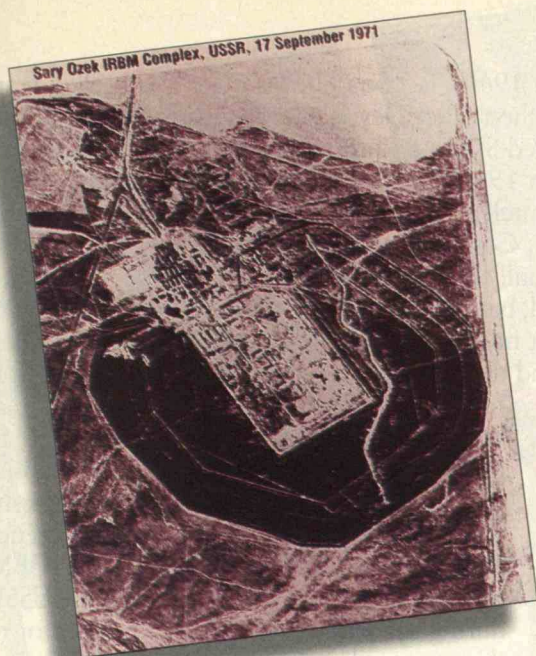
altitudes. There were probably better theorists, but few were as handy and dedicated, and he took the engineer's credo seriously; he was the type to keep attacking a problem from every angle until it was solved. "They said they wanted to have a camera with certain capabilities; my job was to make it a reality," he says. In 1959, Corona's cracking film required him to focus all his talent and energy.

As he draws a diagram to explain the cracking-film problem, his sketch recalls the worst of the old 16-millimeter projectors that required film to thread, loop, and change direction in a maze-like track. "I still shudder when I think of that camera apparatus," he says.

A key to the success of Corona's imaging system was its use of a panoramic camera—a clever design for providing a wide image that had first occurred to Levison while he lay in a hospital bed with a herniated disk several years earlier. The lens in such a camera pivots steadily to record a swath-like image on a length of film, much as a copy machine scans across a document to transmit an image to the drum. While this brainstorm convinced military planners to put the fate of Corona's camera in the hands of the Levison and Madden team, the design required a stable yet maneuverable platform, not to mention tricky mechanics to move a two-foot-long piece of film from the supply roll through the camera and then onto the recovery vehicle for return to earth. And this maneuver exposed the film to the vacuum within the satellite, allowing the moisture in the emulsion to evaporate and the film to crack. "The least crack in acetate," Madden says woefully, "and it's gone."

To tackle these problems, Madden eventually designed a special "starwheel" mechanism that, much as a car's automatic clutch controls acceleration, moved the





film gently from a stationary position up to full speed to avoid jerking and possibly breaking it. But despite the ingenious design, the team could never reliably avoid the cracking problem which, as Madden recalls, “always hung like a sword of Damocles over our heads.” Frequently on the verge of despair, Madden and Levison privately speculated that the acetate film would prove unable to withstand the hostile conditions of space. But giving up was not a possibility. Help finally arrived when a research team at Eastman Kodak discovered how to adhere emulsion to a polyester-based film, which proved much more durable under harsh conditions.

Although the program’s code name supposedly sprang into a CIA operative’s head as he stared at his Smith Corona typewriter, the cameras’ early images were scarred by an electrostatic discharge, also known as corona, that had long proved troublesome in aerial photography. This discharge occurred when opposite surface charges on the film and rubber rollers created a current as the film separated from the rollers in the low pressure of space—producing a fog on the exposures and streaks that looked like lightening. Under Madden’s supervision, technicians in the lab worked around the clock to find a cure. Their efforts included adding carbon to the rubber to make it slightly conductive and using rabbit fur to draw the charge off the film. Neither fix worked. Even Harvard physicist and Nobel winner Edward Purcell, a consultant to the team, was stumped.

Speculating that the problem stemmed from contaminants on the rollers, Madden’s team tried boiling them in a pressure cooker for several hours. That approach sometimes worked, but never reliably. So Madden decided to pursue a pragmatic system of trial

and error: his team tested pairs of the boiled rollers in a vacuum chamber, and if the rollers produced no corona markings they were mounted in a flight camera and tested again at Itek and Lockheed. Any units that failed were recoated with rubber and sent through the process again. Only about 10 percent of some 200 rollers winding through the testing loop at any one time turned out to be usable.

“We had to keep going out to contractors, and placing these impossible requirements on them, and we could never tell them why,” Madden recalls with a chuckle. “These people thought we were crazy, asking for parts built to ridiculous tolerances—and they would go crazy trying to get these things to work.” To ensure the crispness of the panoramic camera’s optics, for example, the two-foot-long lens casing had to be cast from aluminum and then machined by hand to tolerances within a thousandth of an inch.

As the Levison and Madden team labored, Corona’s other teams also frantically tried to surmount the numerous problems that had plagued the first year’s launches. For example, the so-called spin rockets used to stabilize the Agena recovery vehicle tended to explode until the fuel system was redesigned. Designers also had to search constantly for ways to cut weight from Agena because boosting the heavy vehicle into a precise orbit required every ounce of thrust available in the Thor rockets.

Although each launch incorporated at least one major modification, something new always seemed to go awry. By the ninth failed launch, team members began to speculate that they would never retrieve a payload from space, and rumors began to circulate that the program would be canceled. Urged to press on, Corona engineers would ultimately make and remake virtually



all the components from scratch. "To their great credit," Madden says, "the contractors stuck with us even though they probably could have made a lot more money and had an easier time working with more reasonable customers."

## An Enormous Floodlight

Having spent most of their professional lives sequestered within the government's black budget, team members never imagined that they would have the chance to actually share their stories. In its earliest days, the project was deemed so sensitive that written memos were prohibited. "We had absolutely no reason to assume this would ever be declassified," Levison attests. It was inconceivable that he and Madden would live to joke about it all with Nikita Krushchev's son Sergei at the very headquarters of Itek Co. where they built the Corona camera. Or that they would be lauded as heroes by a U.S. president who was still in grade school at the time of their initial efforts.

Both well into their seventies, Levison and Madden make an odd pair today: Levison, the stiff patrician, Madden the unvarnished Boston local. Recounting their tale in the high-rise office building housing Levison's Boston-based venture capital firm, they exchange the jocular patter of an old team, like war buddies who lived through the hell of some fierce and protracted battle. "If you wanted to test something to see what it could withstand, you'd bring Walter over," Madden says. "Things would always break whenever he took a look at them. He was famous with us for that."

They are enjoying such banter because today, after decades of secrecy, the Clinton administration has declassified the program and ordered the release of hundreds of thousands of formerly top-secret photos. CIA director John Deutch and many others in the intelligence community used the project's official unveiling to fete Levison, Madden, and other Corona veterans in Washington. Richard Helms, CIA director when the program ended in 1972, compared the Corona team to the Wright brothers for "their role in shaping history." Albert D. Wheelon, former Corona manager and deputy director of the CIA, likened the early satellite photos to "an enormous floodlight turned on in a darkened warehouse."

Because of the efforts of the Corona team, Deutch stressed, an explosion of intelligence "profoundly altered the course of the Cold War and was probably instrumental in keeping us back from the nuclear threshold." For example, despite raging public debate during

the early 1960s, Corona photos quickly dispelled fears at the highest official levels of any "missile gap" between the United States and the Soviets. While the CIA estimated in 1960 that the Soviets had constructed some 3,000 nuclear-equipped ballistic missiles, Levison explains, Corona satellites revealed that "at that time they actually had about 6."

Indeed, before Corona, Wheelon has noted, estimates of Soviet military power "were surrounded by uncertainty and disagreement. In this climate, it was possible for the hawks to argue that the Soviet threat was enormous, while the doves were able to maintain that it was trivial." The satellite photos made possible the unequivocal tone exemplified by a secret 1968 intelligence memo that simply stated: "No new ICBM complexes have been established in the USSR during the past year." John Pike, director of the space policy project at the Federation of American Scientists, attests that Corona made the difference "between not knowing how many airfields the Soviets had and being able to count their missile silos."

According to Wheelon, it was the accurate assessment of the Soviet nuclear arsenal that emboldened top officials in the Kennedy administration to stand firm during the Cuban missile crisis. And Corona's advance warning allowed U.S. policymakers to take in stride Russian efforts to build antimissile arms in 1963, as well as China's attempts to ready its first atomic bomb in 1964.

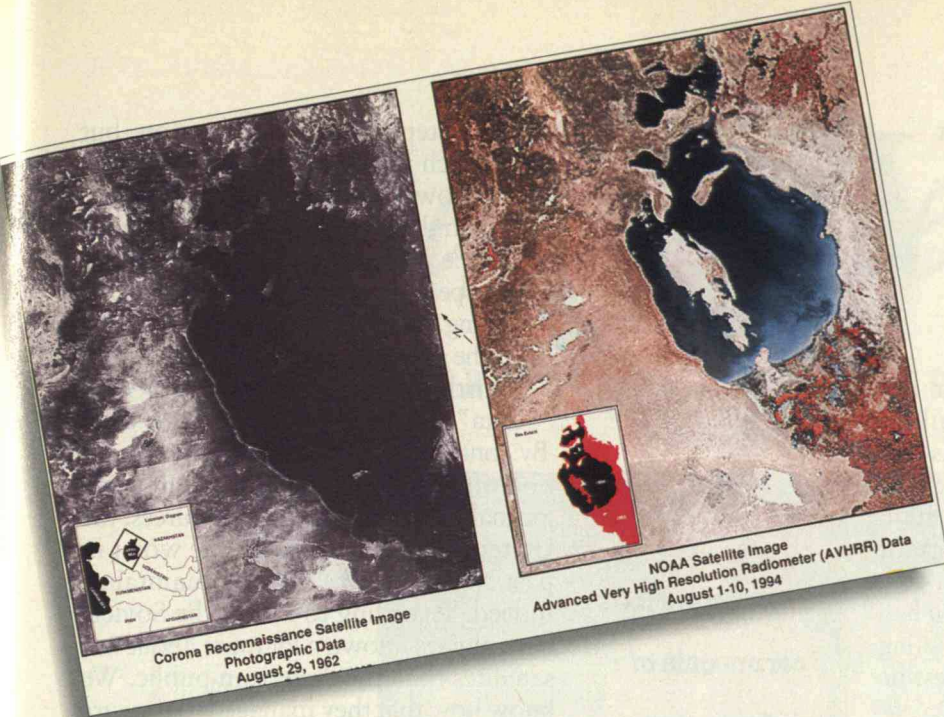
During the Middle East War in June 1967, Corona images revealed the precise number of Egyptian, Syrian, and Jordanian aircraft that the Israelis had destroyed—information the United States probably shared with the Israeli government. And remote surveillance would become a key factor in the Strategic Arms Limitation treaties with the Soviet Union. "It just wouldn't have been possible to get the SALT 1 treaty without spy satellites," maintains Pike, explaining that they afforded policymakers on both sides the confidence that they could detect violations.

## Back to the Future

This summer, when all Corona's images are expected to be available on the Internet, scientists plan to use them to further research in a variety of fields. Some hope to pinpoint archeological sites while others intend to study the cache to discern changes in river beds and deserts. David Skole, an environmental scientist at the University of New Hampshire's Complex Systems Research Center, says the Corona series will shed light on the loss of tropical forests around the world. Willy Weeks, glaciol-

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Scientists are using recently declassified Corona photographs to study changes in the earth's environment. The Corona image at left shows that the Aral Sea was considerably larger in 1962 than when captured in the 1994 satellite image on the right.

ogist at the University of Alaska and one of the scholars who urged that the photos be declassified, wants to study the movement of the globe's glaciers, especially in Antarctica where aerial photographs are otherwise virtually unavailable. Some, like Tom Peterson, a research meteorologist at the National Climatic Data Center in Asheville, N.C., will analyze changes in cloud cover and evaporation rates over decades to glean clues about global climate change.

Yet as exciting as this cornucopia of information promises to be, many critics argue that Corona's most prominent legacy is a bloated National Reconnaissance Office (NRO) that retains a pervasive culture of secrecy. The U.S. government initially kept the program clandestine because it feared the Soviets would attack the satellites, and because it hoped to preserve the U.S. technological edge, Wheelon and others say. Because of that decision, no official records exist of Corona's origins between December 1957 and March 1958. The only hard evidence that President Eisenhower was even in the loop is a note recording his verbal approval scrawled on the back of an envelope by General C.P. Cabell, then deputy director of the CIA. And no more than five senior members of Congress oversaw the program's budget, according to a highly classified history of the Corona program penned in 1974 and finally released last year.

This perceived need for secrecy influenced the 1960 presidential election. Dwayne Day, political scientist at George Washington University, notes that while John F. Kennedy milked public fears of a missile gap for political gain, President Eisenhower and Vice-President Richard Nixon realized the claims to be spurious but could not respond because they feared compromising the Corona program. "Eisenhower knew the Soviets were not ahead of the United States,"

Day says, and "had the reconnaissance photographs to prove it. But he couldn't say so publicly."

Because it was difficult to keep the launches completely under wraps, the public was first told that they were part of the so-called Discoverer program to "explore environmental conditions in space." This supposedly entailed building five vehicles, two to carry mice and the third a primate, with the other two vehicles held in reserve in case of failure. Indeed, President Eisenhower used this cover to herald the first successful Corona flight, pulling an American flag from the first capsule to have gone into space and safely returned to earth. Although the announcement helped placate public fears that the United States was falling behind in the space race, what the president didn't say was that the entire Discoverer program was nothing more than a screen for the Corona reconnaissance program.

The second Corona mission—the first to actually return photos—was a much quieter affair: Washington let it be known that all information about the flight was to be suppressed. Unsure how to interpret the order, Air Force officials bashed the gold-plated canister with sledgehammers after its return and dumped the pieces into San Francisco Bay.

The secrecy requirements hampered the launch schedule. Southern California's Vandenberg Air Force Base was ideal for sending satellites into near-polar orbit. But early launches had to coordinate with the schedule of the Southern Pacific railroad that passed through the base—and those windows sometimes lasted only several minutes.

Of course, all those missions provided plenty of room for glitches, some of which offered glimpses of the program. As we now know from declassified Soviet sources, Russian woodcutters unknowingly chopped up one ejected film canister, and another errant can



dropped over Central Asia; Soviet intelligence agents intending to retrieve it found that peasants had wrapped the now-ruined espionage film around poles to provide privacy for a latrine. In southwestern Venezuela in 1964, two farmers hacked the canister and pried loose the radio transmitter for use as household utensils and children's toys. CIA operatives posing as Air Force officials quickly flew to Caracas to recover the charred remains of the film, dismissing the event as an unimportant NASA space experiment gone awry.

By then the Kennedy administration had abandoned cover stories altogether, opting to say nothing about the clandestine launches. As Pike puts it, the satellite reconnaissance program "went from being only somewhat unusually secretive to being grotesquely so by the standards of the day." The U.S. government did not even officially acknowledge it engaged in satellite reconnaissance until President Jimmy Carter broke the silence in 1978. And not until 1992 did officials formally admit the existence of the NRO, which today operates on a still-classified budget estimated at \$6 billion annually. Pike points out that even now the vast enterprise merits only one telephone number in the Defense Department's unclassified phonebook. "That's one hell of a clandestine organization," he says.

Ironically, by the end of 1997, anyone with a credit card will be able to obtain access to a satellite's real-time, high-resolution gaze on virtually any spot on the globe. At least four private companies plan to offer such services, including one based in Russia and another, dubbed Space Imaging, backed by Lockheed/Martin and Mitsubishi. "The ventures mark an enormous change," Pike says, because "they offer to public organizations and news organizations what had formerly been available only to the superpower governments." Imagine, he suggests, if news media or Amnesty International had been able to order satellite pictures of the July 1995 massacre at Srebrenica in Bosnia as it occurred.

So far, such commercial ventures have done little to dent the official secrecy surrounding the U.S. satellite reconnaissance program. Rep. George Brown (D-Calif.) maintains that "the release of the Corona data



**D**espite its cornucopia of information, critics argue that Corona's most prominent legacy is a bloated National Reconnaissance Office that retains a pervasive culture of secrecy.

is a step in the right direction, but much more needs to be done."

Brown, who recently quit his seat on the Permanent Select Committee on Intelligence to be able to speak more freely, advocates allowing the public "maximum access to the nation's sophisticated network of earth-observing satellite and sensor data" now that the Cold War is over. By continuing to try to control information often easily gleaned through trade journals and other unofficial sources, the United States is imitating "the worst in past Soviet practices," he maintains. Indeed, according to Pike, "the Soviets have always known a lot more about our satellites than the American public. We know now that they managed to procure the operator's manual of a late-model Corona satellite two decades ago. But I still can't get a copy of that."

Secrecy not only needlessly keeps the U.S. public in the dark; it also leads to waste. An internal financial audit revealed this spring that the NRO cannot account for some \$4 billion of its funds—an amount, as the *New York Times* noted, equal to the annual budgets of the FBI and the State Department combined. John Nelson, the NRO's top financial manager, candidly acknowledged the breakdown of accountability as a "fundamental financial meltdown." Pike says the enormous missing cache is symptomatic of the cost-is-no-object culture of the NRO. "The cult of secrecy that has hidden the organization so fully from outsiders," he says, "turns out to have hidden it from itself as well."

But Levison and Madden, for their part, don't let complaints about excessive secrecy dampen their pride in Corona's accomplishments or their satisfaction that scientists are putting it to good use. According to Levison, "If you had to be involved in a military mission, it was nice to be in one that collects information. We always felt that the part we played was necessary."

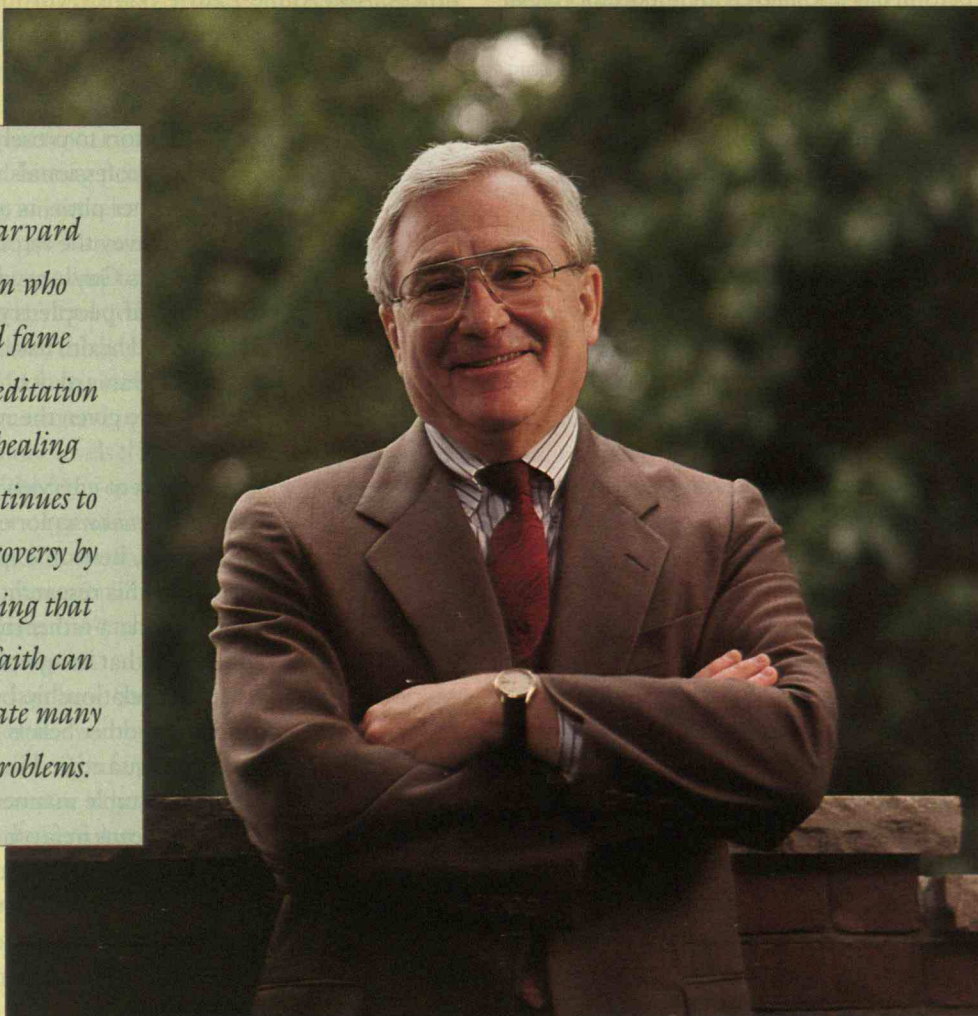
"Necessary?" Madden responds. "It served a critical national need. We'll never know whether the work averted another war, but one thing is certain: the Corona pictures kept us from an even more accelerated arms race by giving us the power to make decisions based on facts rather than fear." ■



# Mindful Healing

AN INTERVIEW WITH HERBERT BENSON

**T**he Harvard physician who achieved fame linking meditation and the healing process continues to raise controversy by maintaining that religious faith can help mitigate many physical problems.



**S**CIENCE AND RELIGION don't generally occupy the same public landscape. And scientists typically strive to keep their research distinct from anything with a religious tone. But then there's Herbert Benson. An associate professor of medicine at Harvard Medical School (HMS) and founder of the Mind/Body Medical Institute at Boston's Deaconess Hospital and HMS, Benson is currently claiming that prayer can sometimes help the healing process and that we may be "wired" to believe in God. Along with arguing these ideas in his latest book, *Timeless Healing* (Scribner, 1996), coauthored with writer Marg Stark, this past December the cardiologist turned "mind/body" researcher organized a Harvard Medical School continuing-education





course, "Spirituality and Healing in Medicine," that attracted more than 900 participants as well as extensive newspaper and television coverage.

Benson has long received popular attention, starting with the publication of *The Relaxation Response* (William Morrow & Co., 1975), the first of six books he has written or coauthored for the lay reader. More than 3.5 million copies of that text, a description of research linking meditation and health benefits, have been sold. Benson has also played an important role in advancing new ideas for medical professionals about healing. His research on relaxation "has been widely accepted by the behavioral and medical-science communities," says Norman Anderson, associate director for behavioral and social sciences research at the National Institutes of Health—as evidenced by the fact that the Mind/Body Medical Institute has branches at six hospitals around the nation.

Still, Benson has never shied away from controversial ideas. After becoming intrigued some 30 years ago with how mental stress can affect physical conditions, Benson studied practitioners of transcendental meditation (TM), which involves silent repetition of a mantra, a simple sound to quiet the mind. He was well aware that the research would seem off-the-wall compared with traditional medical studies. But after finding that TM can cause a number of bodily changes such as reduced metabolism, heart rate, blood pressure, and breathing rate, Benson considered how other meditative practices and placebos (inactive substitutes for medication) affect health.

Such ideas can raise eyebrows among the medical establishment. Gerald Weissman, director of the division of rheumatology at New York University Medical Center, suggests that Benson's influence may encourage credulous people to spend millions of dollars on scientifically unproven therapies. Weissman also calls the Harvard doctor's emphasis on the relationship between stress and disease "Pollyanna-ish." The "evidence is poor for stress-based diseases," Weissman

says, offering as an example the fact that researchers have recently determined bacteria, not stress, to be the cause of stomach ulcers.

Now Benson is linking faith and healing, a connection that also riles critics. Albert Ellis, a clinical psychologist and founder of the Institute for Rational Emotive Therapy in New York, claims that practices like prayer and meditation distract people from believing in their own abilities to reason during critical periods such as illness. And Annie-Laurie Gaylor, cofounder of the Freedom from Religion Foundation in Madison, Wis.,

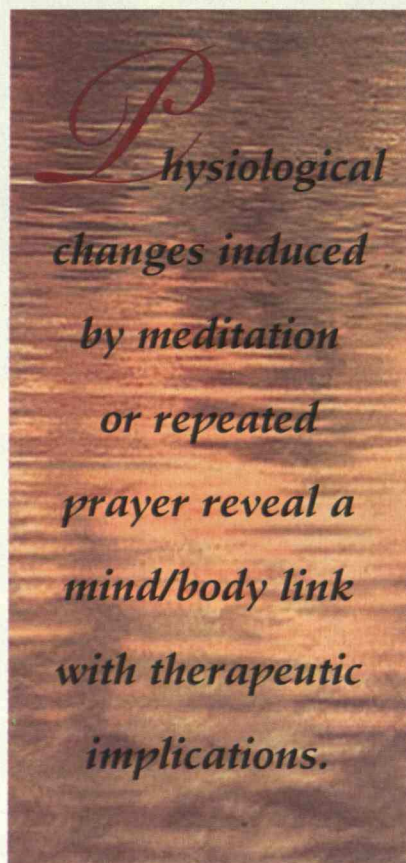
worries that work along the lines of Benson's will, in some cases, "lead doctors to proselytize." Even medical professionals who simply ask whether patients are religious could convey the wrong message, comments Gaylor, who says the number of people trying to link prayer and health has boomed and that the Harvard doctor's credentials "have given the movement a big push."

In a recent interview with *Technology Review* senior editor Laura van Dam, Benson explained and defended his research, saying it is based on data rather than opinion. He noted that he agrees with critics that any relationship between religious and other beliefs and healing must be quantified in a scientifically reputable manner. But if the evidence leans in favor of practices such as prayer and meditation, a payoff might exist, Benson claimed, that could be appreciated by even the most traditional of the

medical community: help in the battle against rising health-care costs.

**TR:** Why do you associate stress with a variety of ailments?

**BENSON:** Perhaps the best way to show this is to refer to the stress response people use to adjust to change. First described by Walter B. Cannon, a physiologist at the Harvard Medical School at the turn of this century, the fight-or-flight response liberates the hormones epinephrine and norepinephrine—also called







adrenaline and noradrenaline—into the bloodstream. That leads to rises in heart rate, blood pressure, breathing rate, and blood flow into the muscles, thereby preparing us to fight or run. This response has been vitally important in terms of our evolutionary success.

In modern life, the amount of change to which we have to adjust is tremendous, even more than in the past; we encounter the fight-or-flight response almost daily. We have to adjust to everything from the anxiety of sorting out information overload to various forms of violence that occur all too frequently around us, such as impatient drivers suddenly screaming out car windows or people threatening one another on the street. Generally we refrain from running around the table or lashing out and hitting people, but when our hormones kick in they nevertheless lead to a number of psychological changes—anxiety, mild or moderate depression, and anger—and to physiological changes as well. Researchers have related these hormonal surges to high blood pressure, cardiac irregularities, and lower pain thresholds. In fact, since once you feel pain you worry about it, you can end up in a vicious cycle, stimulating higher hormone levels that cause you to feel pain more.

Surges in the fight-or-flight hormones are also linked to a number of gender-related medical problems. In men, sperm counts and sexual performance drop, while in women premenstrual syndrome worsens and ovulation patterns can change. And later in life, hot flashes can increase.

Consider just how bad things can get. If you believe you are infertile, you build up stress. At some point, you may try in-vitro fertilization, at \$7,000 per cycle. Now your money is going, and you worry more and more, and thus ovulate less regularly, reducing your fertility. Frequently when people learn they have a disease, symptoms such as headaches, insomnia, and gastrointestinal problems arise not because of the disease itself but because of the knowledge that they have something.

**TR:** Has all of this been documented?

**BENSON:** Heavens, there are literally thousands of cases relating stress to medical problems. My own work on establishing the mind/body connection started when, as a young cardiologist, I noticed that people's blood pressures were higher during visits than at other times. I could tell this because after I would put patients on antihypertensive medicines to lower their blood pressures, they'd call in about symptoms like fainting,

which indicated that their adjusted blood pressures were generally too low. Yet those doses were in accord with the blood-pressure levels noted during visits, and the calibration was correct.

That led me to stop my routine progression in cardiology and return to physiology research at the Harvard Medical School to try to establish a model for stress-induced hypertension. We succeeded at that in the late 1960s, using biofeedback technology with monkeys. By using electrical stimuli to alter behavior, we could train them to either raise or lower their blood pressure. In fact, we could induce permanent hypertension in them.

While we were studying the monkeys, about 15 young people came to me and said they were involved with a practice called transcendental meditation, and asked me to study their responses to stress. After considerable hesitation, I decided to do so—very quietly. We attached electrodes to their chests and scalps to measure their heart rates and brain waves. We used masks to collect their breath as they exhaled, so we could measure metabolism and rate of breathing. We then took baseline measurements while the subjects sat quietly for 20 minutes, then measured them again while they meditated for 20 minutes, and then measured them one last time while they sat quietly without meditating.

**TR:** What were the results?

**BENSON:** Through the simple act of changing their thinking patterns, the individuals had a significant decrease in their metabolism during meditation—17 percent; their rate of breathing dropped 20 percent; and the frequency of the brain waves lowered. Twenty-seven years ago we published our findings on this physiological response in the *American Journal of Physiology*. We considered the changes opposite to those of the fight-or-flight response. While these effects may not seem surprising, they had not previously been scientifically recognized as a coordinated response.

**TR:** But that was a specific rather than a general form of meditation.

**BENSON:** Yes. But we thought there was no reason why one method would be the only way to elicit what we noted, which we called the “relaxation response.” So I dissected TM into its basic components and hypothesized there were two basic steps for such meditative processes. One is a repetition—generally silent—of a sound, a word, a phrase, or a prayer. Or this can





even take the form of awareness of one's own breathing. The second component is passively setting aside other thoughts when they come to mind and returning to the repetition.

I then studied the world's secular and religious literatures and discovered that these two steps were present in practices in virtually every human culture. The earliest account I found is Hindu; it speaks of individuals focusing on their breathing and repeating a phrase of scripture on each out breath while disregarding everyday thoughts. The same concept was employed in one practice of early Judaism. In Christianity, prayers codified in the fourteenth century taught people to focus on their breathing while repeating the prayer, "Lord Jesus Christ, have mercy on me." We found the same pattern in Islam, Shinto, Taoism, and Confucianism. Only the words differ.

So we studied more people, asking them simply to repeat the number "one," or to say a prayer, and found the same physiological changes. This boils down to a mind/body link with therapeutic implications: if you think in a certain way, then measurable, predictable, and reproducible physiological changes will occur that are opposite to the fight-or-flight response.

By the way, I'm sometimes asked whether other quiet activities, such as going to a museum or watching TV, work in this manner. Most often such pursuits do not break the chain of everyday thoughts that can evoke the fight-or-flight response.

**TR:** How can use of the relaxation response help with medical problems?

**BENSON:** In the past 20 years my group has been applying this general technique to medical problems caused by or made worse by stress. You have to understand that I don't consider our work alternative medicine. I advocate performing the relaxation response in conjunction with other treatments. The metaphor that best explains our work is the three-legged stool. One leg is pharmaceuticals, another leg is surgery and other procedures, and the third is self-care. That last leg includes nutrition, exercise, and the relaxation response. It's vital not to neglect the last leg, because 60 to 90 percent of visits to doctors are for conditions related to stress, where employing pharmaceuticals and surgery is not effective.

**TR:** Those numbers are so high. What do you base them on?

**BENSON:** A variety of studies. For example, in 1989 Kurt Kroenke, a primary-care physician at Brooke Army Medical Center in San Antonio [now at the Uniformed Services University of the Health Sciences in Bethesda, Md.] and A. David Mangelsdorff, a psychologist at the Army Medical Department Center and School in San Antonio, studied the military personnel and their family members who were attending an outpatient clinic. These people were going for routine reasons. Kroenke and Mangelsdorff found that thorough, state-of-the-art testing could not detect a physical explanation for complaints 74 percent of the time.

**TR:** Might an example be if I have an allergic reaction and go through the usual battery of skin tests but the results don't point out a culprit?

**BENSON:** Exactly.

**TR:** But a broken leg is not an example.

**BENSON:** Precisely. Or a tumor. There's no evidence whatsoever that stress causes cancer.

But I want to return to medical problems that are sometimes poorly treated by pharmaceuticals and surgery. With the relaxation response, we can effectively treat conditions such as hypertension and cardiac arrhythmias. In a paper we published in *Science* in 1982, for example, we showed that performing the relaxation response for 10 to 20 minutes once or twice daily decreases the physiological response to fight-or-flight hormones, so more of them are needed to increase blood pressure. The higher threshold means that people are less susceptible to disease. Moreover, we found that the benefits of the relaxation response carry over into other periods of the day. And we have found that for people with chronic pain, use of the relaxation response doesn't make the pain go away but reduces its severity, so patients require less medication and can be more active.

We found that we can also cure 75 percent of insomniacs using this approach. We can treat symptoms of depression in people with AIDS and cancer, and relieve the nausea and vomiting related to chemotherapy. And within six months of completing programs that emphasize self-care—the relaxation response, nutrition, exercise, and the reframing of thinking patterns—more than 34 percent of infertile women become pregnant. This compares with the usual 15 percent of that population who eventually get pregnant.



But I should point out that not all the physical problems you might think could be helped by the relaxation response can be turned around this way. For instance, we initially thought that addressing mind/body interactions would help people lose weight. This has not proven to be the case. There are medical problems that still defy treatments. Unfortunately, doctors telling patients that something is all in their head is a put-down that doesn't help.

### **Explaining the Power of the Placebo**

**TR:** In cases where the relaxation response works, can the placebo effect—in which people get better because they believe that they should improve—be playing a role?

**BENSON:** Yes. And because people have continually asked that very question—usually with the mind-set that the relaxation response is nothing but the placebo effect—I have studied that effect for more than 20 years. Let me give you an interesting example of the placebo effect's extraordinary power. The condition angina pectoris refers to constrictive pain brought about by a relative deficiency of oxygen reaching the heart muscle. Exercise, emotions, or overeating can bring about this pain, which is relieved by rest or nitroglycerine.

Since this condition was first defined in the 1770s, a number of therapies have come along that were at first thought to work but were ultimately recognized as ineffective. In a paper I published in 1979 in the *New England Journal of Medicine* with David P. McCallie, Jr., then a Harvard Medical School student, I found that from 1929 (the earliest we could track reports), when enthusiastic doctors believed in those therapies, they helped as much as 70 to 90 percent of the time. But later, when significant research had been conducted on the approaches and they were debunked, their effectiveness rate dropped to about 30 percent.

You have to recognize that until the 1850s, aside from

one or two exceptions like quinine and lime juice, which contains vitamin C, medicine did not employ active medications. They were virtually all placebos. Then scientists like Louis Pasteur and Robert Koch came along, identifying bacteria and establishing that bacteria cause certain diseases. And researchers began to develop antidotes, such as antitetanus medication, that worked specifically and did not depend on whether you or your doctor believed in the therapy.

A flood of such findings soon came down the pike. Insulin injections could keep diabetics alive, penicillin could treat pneumonia, streptomycin could cure tuberculosis. And surgery underwent so-called miraculous changes, so that today, for instance, we can cure blindness from cataracts almost on an assembly-line basis.

The placebo effect absolutely paled compared with these awesome therapies and procedures, so these came to dominate. But ironically, most medical visits now are not for problems that can be affected by pharmaceuticals and surgeries.

**TR:** Are you saying doctors now go overboard in recommending active medicines and procedures?

**BENSON:** Not exactly. These are definitely needed. But many doctors may be overlooking the ways that belief can assist other therapies

and often cure on its own.

I have developed a biological hypothesis to explain how beliefs can be translated into treatments. First, you need to recognize that the brain is incredibly plastic, so that every mental activity we experience is incorporated into its vast network of neurons, its cells. Consider one case. Stephen M. Kosslyn, a professor of psychology at Harvard, asked people to stare at a grid while a PET-scan image [positron-emission tomography] was taken of their brain. This technology shows where specific areas of nerve cells are activated. When Kosslyn then asked the subjects to close their eyes and visualize the same grid, he found that the same area in



IN 1991 THE DALAI LAMA SPOKE AT A HARVARD MEDICAL SCHOOL CONFERENCE RUN BY BENSON'S MIND/BODY MEDICAL INSTITUTE. AT A RECEPTION, THE RELIGIOUS LEADER AND THE DOCTOR SHARED A JOKE.



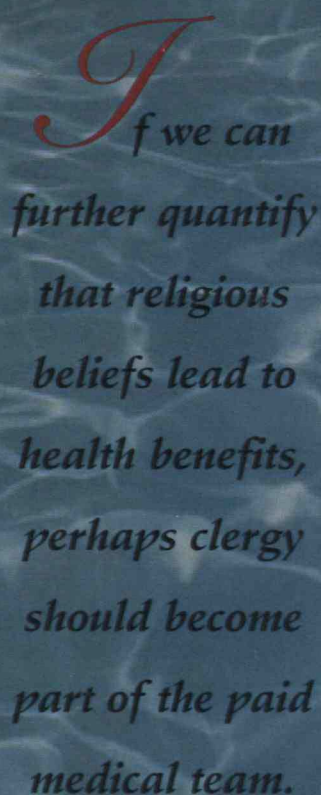
their brains lit up on a second scan. I propose that all of our memories and emotions ultimately reside in neural patterns of our brains—as “neurosignatures.” Kosslyn’s experiment demonstrates that neurosignatures can be activated by thought.

Now take the case of what you might think of as a negative placebo—or “nocebo” effect. As far back as 1962 Yujiro Ikemi, who founded the department of psychosomatic medicine at Kyushu University in Japan, and his student Shunji Nakagawa published a paper in the *Kyushu Journal of Medical Science* about their work with a group of high-school boys sensitive to the lacquer of a certain tree. After blindfolding them, the researchers told each child that one of his arms would be stroked with the tree’s leaves. But the experimenters actually stroked that arm with harmless chestnut leaves. Nevertheless, the arm developed a rash typically associated with the lacquer. Meanwhile, each boy was informed that his other arm would be brushed with harmless leaves, but in fact the experimenters stroked it with the leaves containing the lacquer. Yet on that arm the boys did not develop the rash. My concept is that the boys’ brains had become “wired” with neurosignatures so that belief alone led them to activating patterns that sent signals to the arms to develop a rash—or not develop a rash. I’m suggesting that at some functional level this is a similar response to what Kosslyn’s patients showed when they were simply thinking of the grid.

The same phenomenon might also occur if someone were to concentrate on something soothing. Think of looking at a picture of a scene you associate with feelings of well-being. The experience sets off a particular electrical pattern in the brain—another neurosignature. If you get a headache a few days later, you can visualize that scene. The brain associates that with feelings of wellness, which eliminates your headache. So if you have a headache but think of a scene that induces a nonheadache pattern, the headache pattern in your brain may go away. If you have a rash but use a pill you

believe in, your rash may go away even though the pill is a placebo.

Of course, your thought patterns can also produce stress. If you dream you’re being chased, for instance, your heart will beat faster and your blood pressure will rise.



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TR: Aren’t you making a huge leap from how the brain can integrate a visual impression to how it may affect a medical condition?

BENSON: What I’ve concentrated on over the years has been studying the database of drug trials, for many conditions, that include placebos. Along with finding that placebos work a surprising amount of the time, I’ve identified three components that are needed to enable such activity: belief on the part of the patient, belief on the part of the healer/physician, and belief engendered by the relationship between the two parties. In 1975 I published a piece describing that in the *Journal of the American Medical Association*.

Now we need to use modern brain-imaging technologies to examine the brain itself and determine the validity of my hypothesis. A study could, for instance, examine what happens in the brain during periods of pain when doctors

can find no physical causes, and determine whether visualizations and relaxation procedures can change the patterns.

### ***Faith and Healing***

TR: In your new book you go beyond your hypothesis about the placebo effect and your work on the relaxation response to postulate that we may be “wired for God.” What does that mean, and why would it matter medically?

BENSON: For many, the ultimate belief system involves a religious faith. Ever since the earliest writings, people have described a sense that there is a force greater than





their own lives. One can make the case that we are the only species on the planet whose individuals know they're going to die. That reasoning ability could be counter to our survival. We might question the value of striving and reproducing, since we're all going to die. Even our sexual drives could be diminished, since we know that depression reduces libido. From this perspective, one can argue that our evolutionary success may at least partly stem from our brains being wired for God. Look at how many people have religious beliefs. Gallup polls have found that 95 percent of Americans say they believe in God and 90 percent pray regularly.

My point really boils down to that if you're a religious believer, you might use your faith for medical purposes, since many times belief has been associated with healing. More than 200 studies have shown that faith can produce better medical results—and many of these are independent of whether someone refrains from smoking, using alcoholic substances, or pursuing other harmful practices banned by some religious groups. Of course, not all the studies are equally good; some lack proper controls. But let me describe one that was done on a sound scientific basis.

Psychiatrist Thomas E. Oxman and a group of colleagues at Dartmouth Medical School studied patients over age 55 undergoing open-heart surgery for valve replacement or coronary bypass. Those who believed in God had one-third the mortality of the others. Those who believed in God and had an active social-support system had one-tenth the mortality. By the way, it wasn't a particular religion that was bringing about these changes but rather any religion.

**TR:** Isn't there a danger that some doctors with a religious bent may inappropriately promote prayer among patients who would not otherwise be so inclined but who are at a particularly vulnerable point in their lives?

**BENSON:** It would be totally unacceptable for a physician to say to an agnostic or atheistic patient that he or she should pray. In those cases, a doctor should simply speak about the power of belief, perhaps noting that the medical regimen can be coupled with the relaxation response, which many people evoke in a secular fashion by, say, visualizing wellness.

By the way, I think we must develop psychological scales that will measure the strength of a given individual's beliefs. Then we could compare the value of reli-

gious beliefs with secular beliefs for dealing with various illnesses. I hypothesize that it's the strength of belief, not the content of the belief, that counts.

Still, I don't want to discount the value of a religious faith. If a doctor learns that a person has such beliefs, then not mentioning the power that this may hold in reinforcing the healing process would be inappropriate. For many people religion far transcends medicine in importance.

**TR:** Even when the religious person is someone other than the patient?

**BENSON:** The model I'm proposing does not incorporate intercessory prayer—the idea that someone can invoke healing in another person by praying for him or her. I don't understand that idea, which rests on invoking a mechanism that science knows nothing about.

My idea is to use the relaxation response to counteract the harmful effects of stress and couple it with the power of belief, which I also call remembered wellness, to enhance its efficacy. For example, evoke the relaxation response through use of a word, sound, or phrase that is consonant with one's own belief system. For some this will be secular; for others, religious.

### *Using the Tool Wisely*

**TR:** What practical lessons would such a model hold for our health-care system?

**BENSON:** I think that if we can further quantify that religious beliefs lead to measurable, predictable, and reproducible health benefits, perhaps clergy should become part of the paid medical team for patients desiring religious assistance. Today religious leaders work in hospitals without reimbursement. Frankly, such visits by clergy are going to cost less than those by doctors.

As legislatures and health-maintenance organizations consider what should and should not constitute insured health-care expenses, they must be careful not to dismiss treatment related to the third leg of our stool. Administrators today are often telling doctors and other health professionals to spend less time with their patients. But the more time a physician spends with a patient, the lower the likelihood of a revisit, because the patient has been taken care of. Care-givers need to take the time to discuss matters such as stress, the relaxation response, and the power of belief in heal-



ing. The patient needs to learn, for instance, to visualize a pretty scene when he or she is feeling well, and then to think again of that scene during, say, a period of pain. Medical providers need to ask patients to look through their day for their pressure points, such as if a heavy traffic flow during their commute makes them angry, so patients can learn where their ideation is causing real problems. These are the kinds of things that a doctor, or some other member of the medical team, must include.

We have found that approaches like these, when utilized in an HMO setting, along with proper nutrition and exercise, decrease visits by between 35 and 50 percent. This saves money.

TR: People have often misconstrued your

*If people  
carry my ideas  
to an extreme,  
patients may  
worry that they  
caused their  
illnesses.  
Such blame  
can actually  
hurt recovery.*

message so that they blame an enormous amount of disease on stress. Glib comments that are often wrong abound: "If you just relax, you'll get better;" or, "If you don't deal with your stress, you'll never heal."

BENSON: I am agast that people sometimes carry my ideas to an extreme and allow patients to unfairly worry that they caused their illnesses; such blame can actually hurt recovery, and certainly can make suffering all the worse. It's hogwash to think that if someone has breast cancer and she dies from it she was too "weak" in her thinking to turn it around. People have to remember that a balance of treatment from that three-legged stool will give most patients their best hope. ■

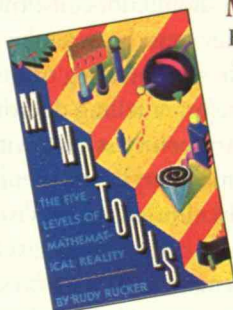
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# MITnews

FROM THE ASSOCIATION OF ALUMNI AND ALUMNAE OF MIT OCTOBER 1996

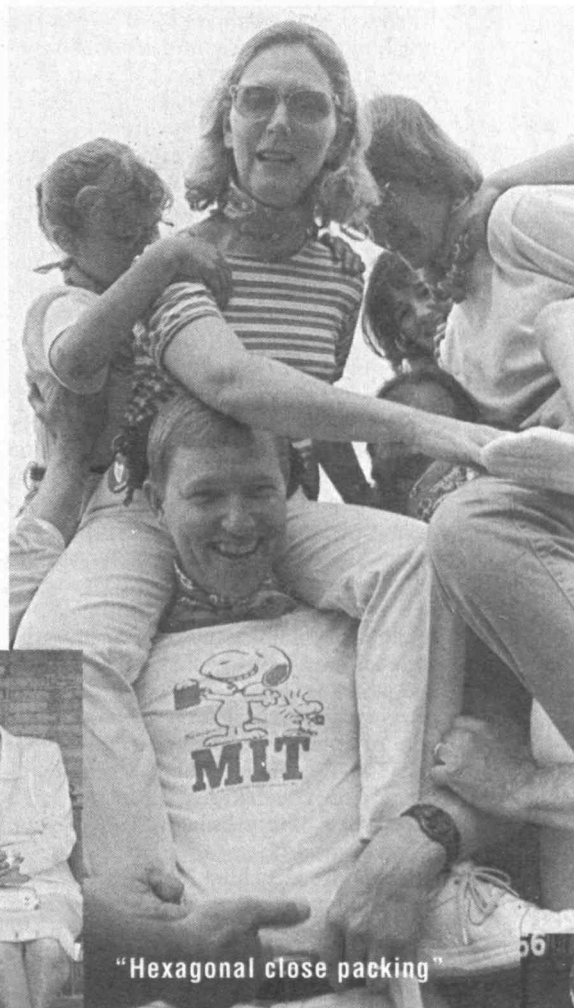
## Reunions '96

### Technology Day

**W**HAT continues to attract Karen Arenson, '70, to MIT, the 1995-1996 Alumni/ae Association president told a crowd of nearly 900 attendees at the Technology Day luncheon, is "MIT's style of feet to the ground, head to the clouds, pride but no pretense." This theme was repeated time and again throughout the presentations of awards and class gifts.

Arenson hailed the most senior alumnus in attendance, Malcom "Buzz" Burroughs, '20, and alumna, Marjorie Pierce, '21, (who was representing her 75th class reunion) and welcomed the 188 newest members of the Cardinal and Gray Society, an informal association of alums who have reached their 50th reunion. She said of the "sartorially splendid" red jackets, "*Vogue* may not bestow on you fashion awards, but to us, those jackets are special, and we honor them and you."

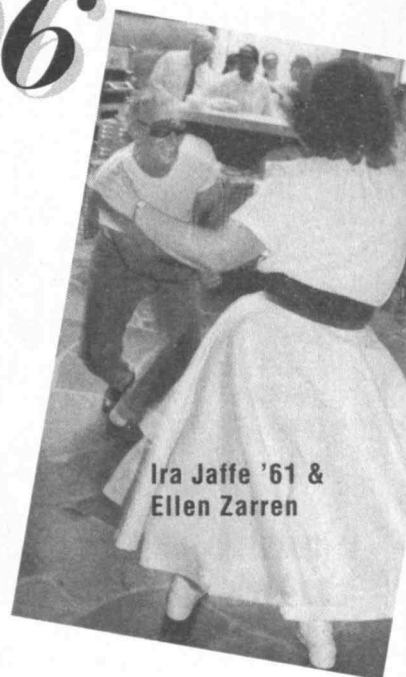
Arenson also noted that 18 international alumni opted to come back to Cambridge for Technology Week, traveling from Canada, Colombia, Ecuador, England, France, Germany, Greece, Israel, Mexico, Panama, Pakistan, and Qatar. Gerald Thomas, '76, who came from Australia, had traveled the farthest.



"Hexagonal close packing"



Marjorie & Ted  
Henning '46



Ira Jaffe '61 &  
Ellen Zarren

*F*rom the Tech Challenge Games, through the Class of '61 Sock Hop, the Class of '46 reception at the president's house, the awarding of honorary-alumnus status to Sailing Master Hatch Brown at the T-Day luncheon, and the kids digging

in at the barbecue, Reunions '96 were a classic good time.



Techsas BBQ



Hatch Brown



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## Inventive Impresarios Stage an Evolving Event

*I have been an observer of MIT reunions for some 12 years now. It seems to me that for an event whose major focus is on the experiences shared 10 and 20 and 45 years ago, MIT's quinquennial assemblies are organisms that evolve with surprising speed and are distinctly forward looking. Every year there are a few new wrinkles. This year, for example, marked the first year that graduating seniors, alumni/ae, and all their guests shared a rousing Tech Night at Pops, and it was only the fifth staging of the Tech Challenge Games and the Techsas Barbecue. Next year may see more reunion preparations going on over the Internet. All human activities change over time, of course, and each graduating class has a personality that subtly—or dramatically—alters the mix. But I'd like to note that lots of the changes start as ideas in the heads of Alumni/ae Association staff, and from where I sit, they are impressively inventive and energetic. If you agree, you might say so the next time you encounter one.*

—SUSAN LEWIS

# Reunions '96

continued

A round of applause greeted Arenson's mention of MIT's policy not to grant honorary degrees but rather to acknowledge those who demonstrate extraordinary dedication and loyalty to MIT by making them honorary members of the Alumni/ae Association. This year's honorees are Professor of Biology Phillip Sharp and MIT Sailing Master Harold "Hatch" Brown Jr.

A Nobel laureate, Sharp has made himself available to alumni/ae club events and other functions for more than 20 years, speaking about his own research and the life sciences in general. "Despite the many demands on his time and the various roles he has played at MIT, he is always ready to listen to a request and to see if he can fit a speaking opportunity into his schedule," Arenson said. "This was true before he received his Nobel Prize, and is still his practice today."

Hatch Brown has won many awards during his 29 years of service at MIT, "primarily for his devotion to sailing. But also for his role as administrator, manager, coach, teacher, and friend of the Department of Athletics," Arenson said. "Under Hatch's instruction, 20 MIT alumni and alumnae have been inducted into the college-sailing hall of fame."

Arguably the most important moments at the T-Day luncheon are the presentations by the reunion-gift chairs of the major reunion classes. John Morefield, '56, whose class was celebrating its 40th Reunion, made a compelling speech about the true meaning of giving back to MIT. "By means of our reunion gift, we want to help provide MIT's margin of excellence and assure its continued life, health, and commitment to the highest educational level," Morefield said. "Our gifts and participation (\$5.4 million given by 65 percent of living classmates) demonstrate our vote of confidence in those features that define MIT: commitment to teaching, learning, and the collaborative process. . . and a strong sense of responsibility and obligation to serve others."

Theodore Heuchling, '46, gift chair for the 50th Reunion Class, said that awareness of past generosity helps to motivate the donors of today. "We appreciate what others did in the past to make MIT great and make it available to us when we showed up on campus in July 1943." The gifts and pledges from 66 percent of the Class of '46 totalled \$4.3 million.

Robert N. Schulte, '71, announced a 25th Reunion gift of \$1.36 million from 70 percent of his classmates, including establishment of a Class of '71 Scholarship Fund at \$250,000.

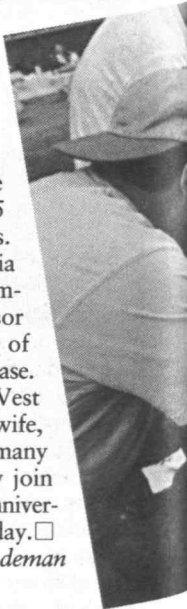
Arenson read out the totals from all the other reunion classes, and noted that several

giving records were shattered by the incredible outpouring of generosity. The class of 1961 broke the record for 30th reunion giving with \$1.9 million; the class of 1951 topped previous 45th reunion giving figures with \$1.45 million; the class of 1926 broke the participation record for post-50th reunion giving with 98 percent; and the class of 1936 outdid all classes in all years with their record-breaking \$13.5 million. (For a rundown on the remaining classes, see the box on page MIT 5.)

MIT President Charles Vest accepted the gifts on behalf of MIT. He thanked the alumni/ae for their support and said "it is essential for our ability to create magic at MIT." He went on to explain that using the words "magic" and "MIT" together in the same sentence might seem strange, "but think again. Magic has to do with wondrous and wonderful transformations. It has to do with creating the unexpected. It has to do with changing our sense of what is possible." As examples of "MIT magic," Vest cited the work of Jennifer Mills, '96 (VIII), interpreting data from the Hubble telescope and the work of James McLurkin, '95 (IV), on tiny surgical robots. Vest also mentioned the Media Lab's advances in digital communications and Professor David Housman's discovery of the gene for Huntington's Disease.

And on a personal note, Vest noted how much he and his wife, Becky, appreciated having so many members of the MIT family join them on their 35th wedding anniversary, which was on that very day. □

—Carol Lademan



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Specify the morning program in  
Kresge on June 8.



Jonathan Lettvin '76



2.70 DESIGN CONTEST



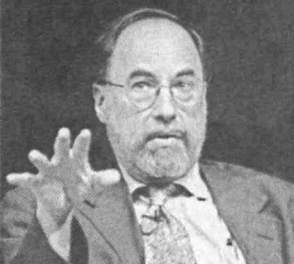
Steve Mann



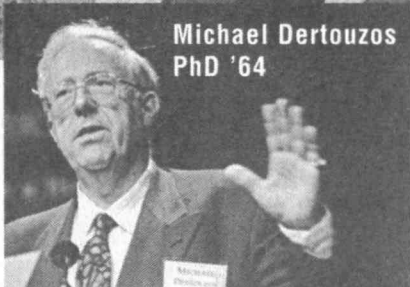
Adam Rizika SM '89



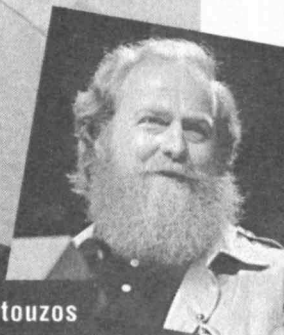
David Baltimore '61



Michael Dertouzos  
PhD '64



Bran  
Ferren '74



John Preston



Ron Fergle SM '86



*A*s vice-president for creative technology at Walt Disney Imagineering, Bran Ferren delivered the opening address for the T-Day morning program with authority—and wit: “To multimedia people,” he said, “‘content’ seems to be a stunning notion!” So much wit that Nobel Laureate David Baltimore quipped, “Whose idea was it to put me on the program after him?” In truth, when he talked about gene research—for example, sharing his excitement about the work on the genes involved in aging while acknowledging that there is a potential for misuse of genetic discoveries—Baltimore had no trouble holding his audience. Equally riveting were John Preston, co-director of MIT’s Entrepreneurship Center, who addressed the T-Day audience on the tremendous advances in materials, and the head of the Laboratory for Computer Sci-

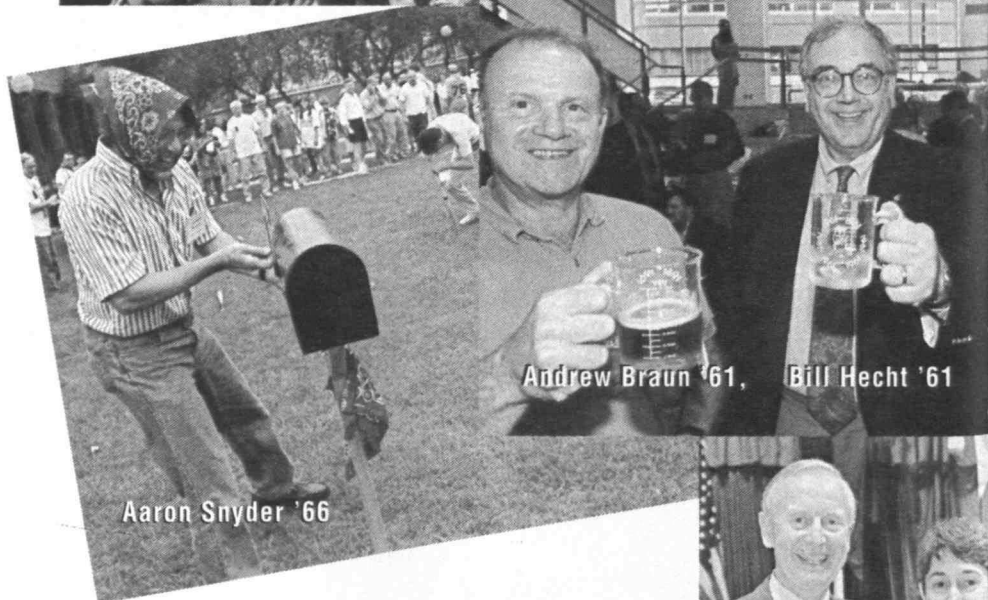
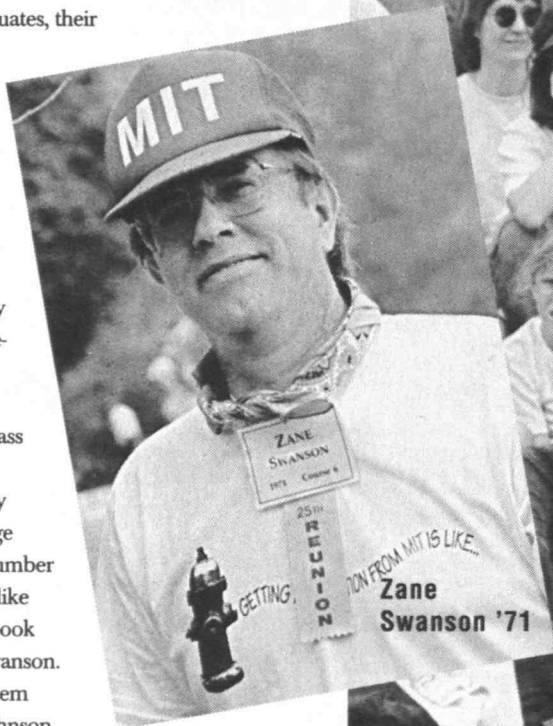
ence, Michael Dertouzos, who talked about the directions for new software and his thoughts on where the “information age” is headed. Pumped up from the morning, alumni/ae flocked to the afternoon panel discussions as well. They fired questions at panelists such as Adam Rizika, an entrepreneur who makes startlingly reflective activewear, and graduate student Steve Mann with his wearable “personal imaging” system. The whole program was testimony to the hard work of the T-Day Committee, chaired by Ron Fergle. The next day’s Tech Challenge Games, including a “2.70 design contest,” was a welcome chance for Jonathan Lettvin, his young recruits, the Class of ’91 competitors, and all their peers to be more or less in continuous motion, after spending much of the previous day sitting still and listening.



# Reunions '96

continued

There were 13 quinquennial reunions this year, and that's not counting the Cardinal and Gray Society gathering that is open to all grads who've reached their 50th reunion. The graduates, their families, and guests eat a lot of carefully orchestrated meals at venues in Boston/Cambridge, Newport, the Cape, and Maine. They enjoy the occasional celebratory beverage, possibly in a souvenir glass, like Class of '61's chemistry-beaker mugs. They record their passage through life in a number of reunion books, like the 25th reunion book edited by Zane Swanson. Almost 2,000 of them assemble in the Johnson Athletic Center for a luncheon at which they toast people who are almost institutions in themselves, such as Chair of the Corporation Paul Gray and Priscilla Gray, and watch the outgoing Alumni/ae Association president (Karen Arenson) hand-off the gavel to the new president (DuWayne Peterson). They hear gift chairs and classmates like David Powers announce splendid reunion gifts. They acknowledge seniority, such as that of the oldest alumna in attendance, Marjorie Pierce. Those of them in major reunion classes, such as reunion-chair Bob Hoffman and his wife, Marion, enjoy the hospitality of Charles and Becky Vest. They dance to music from many eras. They sing—on stage or otherwise. They get silly—and very competitive—playing games. They see in younger and older classes the elan of youth they once had and the enduring curiosity and enthusiasm that will be their permanent trademark. They remind themselves that the most important part of an MIT education is the extraordinary community in which they hold lifetime memberships.



DuWayne Peterson '55,  
Karen Arenson '71





Classes of '71 and '76  
at the Games.



Col. David Powers '26



Marjorie Pierce '22

Class of '46 "Quintet" John Gunnarson (at the keyboard),  
Bob Hoffman, George Ley, Will Hayward, Ralph Huschke,  
Bill Schield



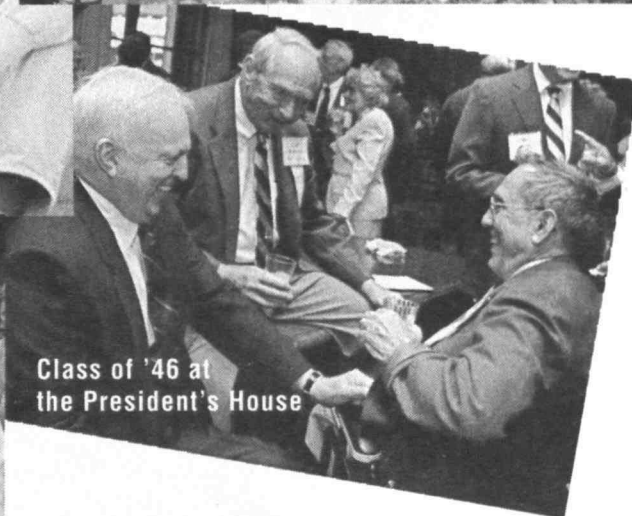
Bob Hoffman '46,

Becky Vest,  
President  
Charles Vest

Marion  
Hoffman

Bennet  
Zarren '61

Class of '46 at  
the President's House



## OTHER REUNION GIFTS

\$2,181,759 from the Class of 1931;  
\$329,287 from the Class of 1941;  
\$652,054 from the Class of 1966;  
\$374,955 from the Class of 1976;  
\$61,407 from the Class of 1981;  
\$48,648 from the Class of 1986;  
\$16,909 from the Class of 1991;  
and \$21,863 from the Class of 1996.

Priscilla and  
Paul Gray '54





# Warren Seamans: MIT's Collector

BY DEBRA CASH

A WOODEN BEAVER GLARES FROM HIS perch at the end of the library table in Warren Seamans' office, overseeing neat piles of paper and an Institute mug stuffed with pens. The beaver is renowned for his industry, of course, and that is one characteristic Seamans shares. Yet another characteristic is more subtle.

The beaver's endeavors actually change the riverway, altering the environment by creating new structures, leaving traces of effort long after that effort is finished. From his own perch in the converted warehouse space that serves as the MIT Museum, Warren Seamans has done MIT's furry mascot proud.

The value and audience appeal of an historical storehouse on campus is no longer contested, but that state of affairs is of relatively recent vintage. In the summer of 1971, for example, then-Corporation Chair Howard Johnson invited Vannevar Bush, '16, to take a look at an exhibit installed along the corridors of Building 14 to celebrate Jerry Wiesner's inauguration as president. Bush declined, saying that he didn't want to waste his time on "that old stuff."

Bush's view may have been typical of the time, but today, well over half a million people visit the main exhibit space every year, with an unknown number stopping by the Museum's Compton and Hart Galleries in Buildings 10 and 5. And it all started with Warren Seamans.

SEAMANS WAS A YOUNG HISTORY GRADUATE OF Colorado State University when he came to work in the MIT Person-

nel Office in 1964. A few years later, when he had become the administrative assistant in the Department of Humanities, he began rescuing MIT artifacts. Richard Douglas, now emeritus professor

from floor to ceiling." Morrissey, who retired last year from her post as MIT's director of special events, was one of Seamans' long-time collaborators. "To me, the warehouse was a horror," she recalls, "but Warren was completely unfazed. He went to work, and they dusted it up and made it into a gallery."

FOR YEARS, THE ONLY COMMITMENT that MIT made to its "museum" was underwriting Seamans' salary. Northeastern students on co-op were brought in to work full-time, with MIT paying only 20 percent of their salaries. Among those students was Michael Yeates, still at the Museum 21 years later as keeper of historical collections. "We would pick up old scientific instrumentation, make inventories for MIT-related artifacts, put up exhibits," Yeates remembers. "Everyone did everything." Warren, Yeates says, was "an unbelievable front man, out there talking to alumni and building up a constituency."

In the early days, departments that had kept their own collections of historical materials handed them over. One of the jewels was an unsurpassed collection of architectural renderings going back to the 1870s, gathered by the Department of Architecture to show the best work of its students. Some items were rescued at the last minute from the dumpster, and others—like the bust of MIT's founder, William Barton Rogers, and oil portraits of MIT's early movers and shakers—were retrieved from basement and storeroom



of history, was Seamans' boss at the time. Douglas laughs appreciatively when he recalls that his assistant just "faded out" of his official job. Seamans then "acquired space up on Mass. Ave. that didn't belong to him," Douglas says, "but he filled it up with so much stuff that it got too expensive to move."

The first time Mary Morrissey saw the warehouse assigned to Seamans' burgeoning collection, "it was filled up with desk chairs



oblivion. Professor Douglas recalls making a “nervy” phone call to I. Austin Kelly III, ’26, an important patron of the Institute, and asking him flat-out to donate \$10,000 to have the portraits cleaned, a donation Kelly made with enthusiasm. For his part, Seamans was soon deeply involved in on-the-job lessons in the chemistry and art of portrait restoration.

By 1975, the Museum had collected enough photographs that had been dispersed among departments, the News Office, and old collections from the *Tech* and even the *Boston Herald* that it was able to provide the illustrations for *MIT in Perspective*, the first photographic history of the Institute. It was the photo collection that first gave the Museum legitimacy off campus, Seamans points out. It became common for his staff to take calls from textbook publishers and writers who were looking for material to illustrate their volumes. And in 1993, when the New York-based Museum of Holography folded, Seamans and others were able to make a persuasive case for MIT to acquire this priceless record of a new technology for the MIT Museum.

IT WAS YEARS BEFORE SEAMANS WAS FORMALLY recognized for the niche he had carved out at the Institute. MIT had established its Archives (administratively part of the Library) in 1961, before Seamans launched his most rudimentary salvage operations. Yet, from a research perspective, printed and visual materials are both valuable and are used as interrelated sources, explains Seamans’ colleague, Archivist Helen Samuels. What is clear, she says, is that one cannot document MIT, an institution of science and technology, without a collection of the material evidence.

As an example, Samuels points to the exhibit honoring Doc Edgerton, “Seeing the Unseen,” created by Eastman House in Rochester, N.Y., and now on a nationwide tour that includes Boston’s Museum of Science. “You can’t document Doc without both the archives—his notebooks and correspondence and scientific publications that the MIT Archives maintain—and the objects—his cameras, sonar, and photographs at the Museum,” Samuels says.



Warren Seamans with two of his enduring attachments: hack memorabilia and his poodle-cum-office-mate, Chip.

OVER THIS PAST spring and early summer, as Seamans prepared to retire from the day-to-day leadership of the Museum, the tributes began to pour in. Most notable is the establishment of Warren Seamans Exhibition Fund, which will fulfill one of his long-held goals: an endowment to ensure continued support for exhibitions. “We are hoping to raise \$100,000 by June 30, 1997, the first anniversary of Warren’s retirement,” says Alan Brody, professor of theater arts and MIT’s associate provost for the arts. “We are hoping that everyone who has profited from Warren’s indefatigable work in the creation and maintenance of the Museum, all the people who feel the same affection for Warren that he holds for MIT, will contribute generously to the fund in Warren’s honor.”

MIT’s first associate provost for the arts, Professor of Music Ellen Harris, who oversaw the Museum for 6 years, concurs in Brody’s high opinion of Seamans. “Warren is remarkable because he had a vision and did something about it. For 25 years he struggled, connived, and insisted in order to advance the cause of the Museum,” Harris says. “Even more importantly, however, he didn’t hold to a narrow vision of the Museum, but let it evolve, so that

now there are four clear curatorial areas: architecture (including the Beaux Arts drawings that were used at MIT to teach the first classes in architecture in this country), Hart Nautical, holography, and science and technology (everything from slide rules and strobe photography to relics of the hackers’ art).

“It must be acknowledged that the MIT Museum is Warren’s child,” Harris says. “He raised it, gave it direction (but not too much), taught it to fly, and now he’s doing the most difficult thing—letting it go. Because of his parental love and care, we can be assured that the Museum will continue to grow and flourish.”

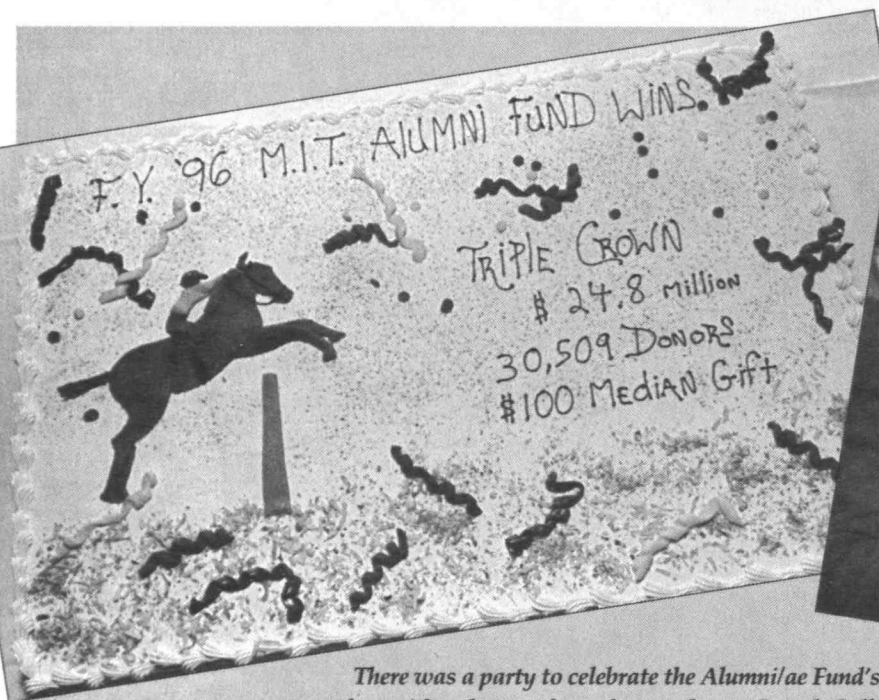
AN ARRAY OF AWARDS, INCLUDING honorary membership in the MIT Alumni/ae Association and the Class of ’35 and MIT’s Gordon Y Billard Award, “for outstanding merit performed for the Institute,” have been conferred on Seamans. And it was a real tribute to his professionalism, and that of his staff of learn-by-doers, when the Museum was accredited by the American Association of Museums in 1984.

As he retires, many members of the Institute community will wistfully recall the Seasonal Parties he is known for, where custodial staff rubbed elbows with the chair of the Corporation, in what Richard Douglas calls “the most egalitarian thing that ever happened at MIT.” Many in the community have also enjoyed Warren’s silly side—amply demonstrated by his lead role in the creation of the Ig Nobel Prize ceremonies and his enthusiastic participation therein.

Many, too, are hoping that he’ll continue to share his harvest of corn and tomatoes, in between making trips to alumni/ae gatherings to speak on behalf of the Museum. Warren, it seems, was raised on a beet ranch in Colorado, which could explain his gift for growing things: vegetables, friends, or a whole new institution. □



# Alumni/ae Fund Takes the "Triple Crown"



*There was a party to celebrate the Alumni/ae Fund's FY '96 success, complete with a theme cake and a very happy Joseph Collins, the Fund director, greeting Karen Mathiasen, SM '71, who was chair of the Fund Board for 1991 and '92.*

**C**OMPARING ANNUAL GIVING AT MIT TO U.S. horse racing's greatest achievement may seem a bit far-fetched, but according to Alumni/ae Fund Director Joseph Collins, "it's a natural fit." There are three scales on which to measure Fund performance: total dollars, number of donors, and median gift. Every year, the goal is to top past performance on all scales—the annual-giving equivalent, says Collins, of winning the Belmont, the Preakness, and the Kentucky Derby. And in the year ending June 30, 1996, the Fund hit and exceeded its goals.

On total giving: the \$24.8 million received in gifts exceeds the FY96 goal of \$23 million—and the previous record total—by a whopping \$1.8 million (8 percent). On number of donors: by coming in at 30,509, the Fund reached the FY96 goal (30,500) and achieved the 30,000-donor level for the first time. And on median gift: 51 percent of the contributors gave \$100 or greater, for a long-sought median gift of \$100.

Of course, there is one big difference. When a horse takes the triple crown, it can count on

a very comfortable retirement. The donors, volunteers, and staff who produced last year's Fund success are running again this year—only faster. Quipped President Charles Vest at the July party to celebrate the record Fund, "this year's performance just shows that we should be setting our goals higher."

Other highlights of the FY96 Fund:

- Gifts credited to the Alumni/ae Fund from non-alumni parents totaled \$555,000—a new record—exceeding last year's total by 80 percent. Further, the 697 parent donors set a new participation record, exceeding last year's total by 16 percent.

- Graduate alumni/ae set a new record for contributors with more than 10,800 donors—the sixth consecutive year of increased donors.

- Undergraduate alumni/ae participation increased to 44 percent, with more than 19,700 contributors; of that total, a record 10,500 (53 percent) contributed \$100 or more.

In general, the numbers of donors represent a very impressive record. At the July party, Collins noted that the achievement of the

30,000-donor level met a goal that had actually been first set 10 years ago, during MIT's *Campaign for the future*. Since 1993, when the number of contributors dropped to 27,000, the Fund has gained a "net" increase of 3,500 alumni/ae donors, Collins observed, "a remarkable show of support for MIT's leadership in education and research." It is worth noting that when organizations such as *U.S. News & World Report* produce their college ratings, they use the percentage of graduates who are donors as the primary measure of alumni/ae "satisfaction" with their alma mater.

The year also marked a new record in overall private support at the Institute. Gifts from alumni/ae, friends, corporations, and foundations totalled \$123.5 million, an increase of 22 percent over last year. Barbara Stowe, vice-president for resource development, believes that this extraordinary leap in giving reflects the strength of the stock market; the efforts of many volunteers, staff, and faculty over the past several years; and most importantly, a growing sense of commitment and loyalty from the Institute's graduates. □



# Staying Connected

**T**HIS IS MY FIRST COLUMN AS PRESIDENT of the Alumni/ae Association. The beginning of anything, be it a new job or one's freshman year at MIT, always evokes a great deal of excitement. The Association's activities are no exception. This issue of *Technology Review* circulates in September, a month that brings us the Alumni/ae Leadership Conference, orientation of new members of the Board of Directors, and the first meeting of the 1996-97 Board. This year the ALC will focus on student life and learning at MIT. President Vest has established a task force to evaluate all aspects of the student experience, and we, the alumni/ae, have been requested to provide input, based on our experiences at MIT and afterward.

I am fortunate to be serving as your president at a time when the hard work of my predecessors is beginning to pay dividends. A major factor in focusing the energies of the Association has been the creation of a comprehensive strategic plan (developed in 1994, during the presidency of Dick Jacobs, '56), which reviewed all the current activities of the Association and explored new areas of opportunity. It is my intention to concentrate on the execution of the many initiatives that are underway as a result of that plan.

One of the most important of these initiatives is providing alumni/ae with more assistance on the job front, which showed up on everybody's list of desirable services. In early 1996, we launched the Institute Career Assistance Network (ICAN), a program through which MIT students and graduates can network with other alumni/ae for help with career planning and job searches. That help can range from general career mentoring to contacts within specific companies and leads on available jobs.

ICAN also offers a compendium of executive search firms, a bibliography of self-help materials, a list of employment services from MIT's Career Services office, and support for career fairs and seminars. To volunteer as an ICAN mentor or to receive more information, alumni/ae may contact the Association office at 77 Massachusetts Ave., check with the local clubs or class officers, or use the form on the Alumni/ae Association Web page at <<http://web.mit.edu/alum/www/Information/Fund/ICAN.html>>.

Another initiative that responds to the declared interests of MIT graduates is Alumni Network Services (ANS), which is being

implemented on a pilot basis this fall. ANS taps into the explosion in use of the Internet and the growth of electronic communities. Leading the Association's moves into this new arena is a volunteer committee chaired by Bob Johnson, '66. Ultimately, many services will be available, starting with e-mail forwarding for life (EFL). But what's important to keep in



*DuWayne Peterson, Jr., '55*

mind is that all our activities in this area will be designed to help as many alumni/ae as possible feel connected to and involved with each other and MIT.

**O**THER, more traditional tools for creating and sustaining strong connections between alumni/ae and MIT are regional and club activities. In April of this year, the Association moved to strengthen those activities by creating a new position, director of geographic programs, whose job will be to integrate all geographically based alumni/ae events and services. Rosemarie Resnick is the new director, and she has completed a regional club survey that will suggest ways our clubs and regional activities can be enhanced and supported by the Association staff.

*Technology Review* is another medium of communication and connection, and a major deliberation in the strategic-planning process focused on the need to put the *Review* on a stronger business footing. A new position was created for a publisher who could increase advertising revenue and gain more exposure for the magazine, which is ranked as the most credible publication of its kind by readers. As editor Steven Marcus reported in his "First Line" in the July issue, Bruce Journey has been hired to fill the position, and he has already created new enthusiasm with his plans and

programs. This is an exciting time for *Technology Review*, and we look forward to its being as successful on the business side as it has been on the editorial side.

**O**NE MEASURE OF WHETHER WE ARE DOING A GOOD JOB with the structures we set up and the services we provide is the performance of the Alumni/ae Fund, which many consider the crown jewel of the Association. It has grown impressively over the years, through the able leadership of a succession of Fund Board chairs working in tandem with Joseph Collins, the Association's director of operations and the director of the Fund since 1979. Each year the Fund Board establishes challenging targets for total dollars donated, the total number of donors, the number of first-time donors, and the median gift. Each year the goals become tougher, and each year the effort and commitment of staff and volunteers become stronger.

The Alumni Fund for the 1995-96 fiscal year broke all records (see Joe's report on facing page), and the people who really should be acknowledged for that achievement are you, the alumni and alumnae who contributed record dollars in record numbers. And in these days of reduced government funding and tighter budgets throughout the Institute, that Alumni/ae Fund is more critical than ever.

Knowing we must continue to build on that success, my plan for this next year is to concentrate on strengthening the Association's communication with the alumni/ae body. The implementation of e-mail forwarding for life and the new director of geographic programs will be big steps in that direction, but I also plan to use the most effective communication medium—face to face—as often as possible. I have already scheduled visits to clubs and regional meetings in Europe during October, and I look forward to attending many club functions throughout the year. If for some reason we don't meet face to face, let's make contact in other forms. My e-mail address is <[duwaynep@cogent.net](mailto:duwaynep@cogent.net)> and I can be reached by phone at (818) 577-9419. I look forward to hearing from you throughout the year. □

*DuWayne J. Peterson, Jr.*

DuWAYNE J. PETERSON, JR. '55, president, Association of Alumni and Alumnae of MIT for 1996-97.



# ClassNotes

**21** Your beloved class president and secretary, Carole A. "Cac" Clarke, died at his home in Brielle, N.J., on May 24, 1996. We are grateful to his son, Alfred L. Clarke, for the following information. Mr. Clarke (or Cac, as he was known by friends and family), was an electrical engineer with ITT for many years. After retiring, he was a reporter for the *Coast Star* newspaper in Manasquan, N.J., for 25 years. Previously, he was employed by Bell Labs, Acousticon, The Victor Co., and Northern Electric. He was the holder of several patents. He was also co-author of the *Handbook of Electronic Instruments and Measurement Techniques*, a college text. In addition to his career achievements, Cac was very active in his community and received awards and

had received the club's Outstanding Alumnus Award. He was the first recipient of the Bronze Beaver, the MIT Alumni/ae Association's distinguished service award. He also served on the Educational Council.

After a recent telephone conversation with Cac, Audrey Saracco, coordinator of class programs for the Association, referred to him as "a man who's thought and heart are voluminous and whose dedication to the Institute and its alumni/ae more than remarkable." In that conversation, he commended the Association for the great strides it has made over the many years he had watched it grow, as he often praised the *Review*. "My life has been wonderful," he said, "and it's so much due to MIT!" After that talk, Audrey suggested, "Do you think we could give him a platinum beaver?"

We at the *Review* staff second that motion.

Besides his son, Alfred, Cac leaves a daughter, three grandchildren, and two great-grandchildren. His wife of 65 years, Maxine (also known and loved in the MIT community), died three years ago. Memorial contributions may be made to the Louis, Tillie, and Maxine Clarke Scholarship, care of the MIT Treasurer's Office, 77 Mass. Ave., Cambridge, MA 02139.

**Benjamin Fisher** of Walpole died February 9, 1996, and **Myer H. Naigles** of Yonkers, N.Y., on September 25, 1996. In 1925, Benjamin joined the Kendall Co. in Walpole, a manufacturer of surgical

dressings and other health care products. He was the company's director of production planning and its assistant treasurer before becoming corporate secretary, the position from which he retired in 1964. For 91 years he was a resident of Dedham, where he was a member of the planning board and a town meeting member. An avid gardener and skier, he was a member of the Appalachian Mountain Club. He leaves his wife, Mary (Brigham), of Walpole; two sons, a daughter, and four grandchildren. . . . We have no further information on Mr. Naigles at this time. Our condolences to the family members of these classmates.

Please send news for this column to Class Notes Editor, *Technology Review*, MIT W59-200, 77 Mass. Ave., Cambridge, MA 02139

**22** **75th Reunion**  
William A. Tripp writes, "Not much to report. I

remain in reasonably good health and still get around despite a hip operation during the summer of 1994. Continue to enjoy that Florida West Coast atmosphere."

Please send news for this column to: Class Notes Editor, *Technology Review*, MIT W59-200, 77 Mass. Ave., Cambridge, MA 02139

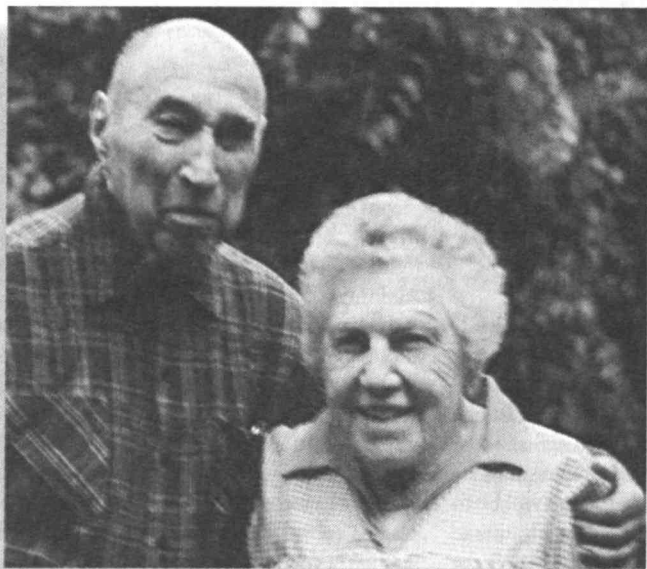
**23** Please send news for this column to: **Royal Sterling**, secretary and president, Apt. D201, 2350 Indian Creek Blvd. W., Vero Beach, FL 32966-5103

**24** **David Lasser** died in Rancho Bernardo, Calif., on May 5, 1996, at age 94. The following is drawn from his obituary in *The New York Times*.

Mr. Lasser wrote *The Conquest of Space*, in which he explored the potential of rocketry. Arthur C. Clarke said it was, "the first book in the English language to explain that space travel wasn't just fiction." The book was instrumental in the formation of a task force that developed into the American Institute of Aeronautics and Astronautics. In 1945, Lasser wrote *Private Monopoly: The Enemy at Home*, in which he argued that economic policies motivated by greed were the source of nearly all modern distress.

A son of Russian immigrants, Lasser was born in Baltimore and grew up in Newark, N.J., where his father cleaned and repaired clothes in a small shop. He dropped out of high school to help his family. Later at age 16, he lied about his age to join the Army in WWI. After the war, he was accepted at the Newark College of Engineering on the condition that he earn a high school diploma. But inside of a year, he considered the engineering course too confining to get into management. Thus, he applied to MIT and asked for a chance. In 1924, he received a bachelor's degree in engineering.

Lasser, who was married three times, is survived by his wife of 32 years, Amelia, of Rancho Bernardo; and a son by his first marriage to Florence Glassberg.—Co-secretaries: Col. I. Henry Stern, 2840 S. Ocean, #514, Palm Beach, FL 33480; Katty Hereford, 237 Hacienda Carmel, Carmel, CA 93923



*Cac and Maxine Clarke*

acknowledgement for his service to Boy Scouts of America, among others. He was a trustee of the Brielle Public Library, a founder and past president of the Union Landing Historical Society of Brielle, and the historian of Brielle. For his newspaper series on the American Revolution, he received a distinguished Citizens Award from the National Society, Daughters of the American Revolution.

Cac was also active, well known, and loved in the MIT community. He attended his 70th Reunion in 1991, as he did for almost every prior Alumni Day (now known as Technology Day) since 1922. He served his class as secretary for 50 years and more recently as president. He was a founder and past president of the MIT Club of Northern New Jersey and



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Gates W. Burrow's son, Wilson, has informed the Alumni Office that his father passed away on May 8, 1995, in Columbus, Ohio. Gates received an SB in architecture and throughout his career worked as a professional architect with headquarters in Santa Ana, Calif. In the early 1960s, he teamed up with a colleague and established the firm of Burrows & Allen. When he retired in the early 1970s, he moved to Laguna Hills, Calif., where he resided until shortly before his death, when he moved to Columbus, Ohio, to be near his son.

Gates is survived by his wife, Lucinda (Griffith) Gates, and his son, G. Wilson Burrows.—F. Leroy "Doc" Foster, secretary, 434 Old Comers Rd., Chatham, MA 02633

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Our 70th Class Reunion was a memorable one. At the luncheon on Technology Day, Bruce Powers reported that new gifts and pledges by our class members over the last five years totaled \$5,033,000, with 90 percent participation. This was the third largest class gift reported at the luncheon; the second largest was not much larger. At our class dinner, we gave Bruce resounding applause as we thanked him for his stellar work as class agent.

We also wish to thank Henry Rickard for his work as "reunion volunteer." Unfortunately, his good letters urging us to attend our 70th did not have such good results. Nine of us registered for the reunion, but only six made it to our class reunion dinner. We missed you. Our class now numbers about 70.

It is always a memorable time for me to get back to the Institute. Each time I learn or see something new. This time I toured the new six-story Biology building. Each floor above the first has offices at either end, library-conference rooms to encourage interchange of ideas and problems on each side in the center, and superbly equipped labs. Four Nobel laureates work in those labs. Did you know that all freshmen are now required to take a course in biology? The first sub-basement in the new building is equipped for that course.

And did you know that one can now take a lecture course in music and theater arts at MIT?

This year graduation exercises were held on Friday of Tech Week rather than the week before. I wanted to go to the exercises and by a stroke of good fortune was given a ticket by Bill Hecht, '61, in the VIP seating area! The ceremonies were impressive, with advanced degrees outnumbering bachelor of science degrees. I was surprised by the way degrees have become so specialized. One more important note. Perhaps some of you do not know that MIT president, Charles Vest, is a member of the board of directors of Du Pont and IBM. This is good for the companies and, it seems to me, it is good also for the Institute to have its president participating in decisions on strategy and management at the highest level in the business world.

Following is news about classmates received by the Review office. . . . Crockett A. Harrison writes in to say he has moved to Green Ridge Village, a retirement community in Newville, Penn.

We have reports of several deaths. Charles E. Poore of Florida died January 23, 1994. Mrs. Poore writes, "He would have loved to be part of the reunion plans. He was 90 years old. We were married 54 years and had two daughters and four grandchildren. A very happy family, and we certainly miss husband, father, and grandfather, Charles E. Poore. He was president of Extra Blancs Cement, Inc., and International Marble Co. based here in Winter Park Fla." . . . James O. Crawford of Rydal, Penn., died August 1, 1995. James was a lifelong member of the Engineers Club of Philadelphia. He was most recently employed at Bell of Pennsylvania, now Bell Atlantic-Pennsylvania, from which he retired in 1968. In retirement, he frequently gave humorous speeches, preparing arduously so that he appeared extemporaneous, family members said. His wife of 15 years, Elizabeth Dahlgren Crawford, died in 1993. He also was married for 44 years to Francis "Susie" G. Crawford, who died in 1975. He is survived by two daughters, a son, nine grandchildren, and 12 great-grandchildren. . . . Millard M. Greer, of North Palm Beach, Fla., died April 4, 1996. Millard worked for the Welgand Co., sold to Emerson Electric, as a VP of engineering and retired from Dittman and Greer, Inc. He served as president of the Boy Scouts Council, and had a reservation named in his honor. He was also awarded the Boy Scout "Silver Beaver." Millard is survived by four granddaughters, a grandson, and three great-grandchildren. He was predeceased by his first wife, Mary Taylor Greer, his daughter, Mary Greer Timberland, and his son, Charles Marquis Greer.

Two others, that we unfortunately don't have any other information about are Kenneth P. Morse of Dayton, Ohio, on October 1, 1995; and Clifton B. McFarland, of Camden, S.C., on January 30, 1996. Our sympathies go out to all the families of these classmates.

Please send news for this column to: John H. Wills, acting secretary, 2366 Wood Ave., Colorado Springs, CO 80907; tel: (719) 475-0005

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## 70th Reunion

Please send news for this column to: Joseph C. Burley, secretary, Isle of Springs, ME 04549; tel: (207) 633-4600

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Fortunately the attrition in our class membership is only one for this issue of the Review, that of Maxwell Parrish, who passed away on January 30, 1996, in Missoula, Mont. Maxwell worked in chemical and civil engineering and as a meteorologist.

Mention will be made at every opportunity during the next year of our coming 70th Reunion in 1998, a notable event for any class and which, we hope, will be attended by a gratifying number, as at our past reunions. Keep it in mind—the time is close.—Ernest H. Knight, secretary/president, 168 Ai Plummer Rd., Raymond, ME 04071

# ClassNotes

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Chung Foy Yee writes, "At age 90, I consider myself in fairly good health. My living style is very simple: daily exercise and outdoor walking with my wife, eat more vegetables

than meats, with cereal as a basic food; no alcohol or smoking; reading in my leisure time. Perhaps this simple style of living has helped me through all these years. I sincerely wish all the living members of the Class of '29 and their families are in good health and enjoying happily their later years."—Class Notes Editor, *Technology Review*, MIT W59-200, 77 Mass. Ave., Cambridge, MA 02139

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In mid-May, Peg and Hal Spaans came to Williamsburg to help a granddaughter graduate from the College of William & Mary. After the graduation ceremonies, they

stopped by to see us and joined us for dinner here at the Landing. After dinner, we had a pleasant evening of reminiscences. We always enjoy having classmates come to see us when they are in the Williamsburg area and hope that more of you will do so. Hal worked for Bell Telephone Co. of Pennsylvania for many years and retired in 1972 as director of Engineering Training. After his retirement, he taught engineering economics for various independent telephone companies, mostly in Florida and North Carolina. Having long been a member of the National Guard and Army Reserve, he gave talks to civic organizations on the advantages of joining the Military Reserve.

Last March I sent John Hanley a birthday card in recognition of his 88th birthday. As I usually do, I included a form asking for news. This form elicited from John a detailed two-page biography which, because of space limitations, must be extensively pruned for inclusion in the Notes. I do appreciate his report and hope that he will not be disappointed by the excisions I have made. John worked for many years for Northern Natural Gas Co. in Omaha and retired as VP in 1973. After his retirement, he did some consulting work and continued to be involved in studies of natural gas reserves. He is still listed as honorary technical advisor of the Potential Gas Committee. His recreational activities include trout fishing, golf, and vacationing in Hawaii. Like most of our other golf-playing survivors, his handicap is increasing faster than his age.

Two more of our classmates have moved from houses to apartments. Jane and Ric Ricciardelli have moved to Apt. 2607, 2401 Old Ivy Rd., Charlottesville, VA, and Mary and Win Hartford have moved to Apt. 3310, Carriage Club, 5800 Old Providence Rd., Charlotte, NC. Win is perhaps our most experienced retiree. It seems like every time I hear from him he has either just retired again or just embarked on another new enterprise. His newest activity is in the field of energy-efficient, controlled-atmosphere metallurgy and by-product utilization.

Once again it is necessary to report the deaths



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Martin C. Murphy, '51  
Edward B. Kinner, ScD '70  
Douglas G. Gifford, SM '71  
Joseph J. Rixner, CE '68  
John P. Dugan, SM '68  
Kenneth L. Recker, SM '73  
Mark X. Haley, SM '75  
Robin B. Dill, '77  
Andrew F. McKown, SM '78  
Keith E. Johnson, SM '80  
Elliott I. Steinberg, SM '80  
Gretchen A. Young, SM '86  
Alec D. Smith, PhD '89

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Thomas W. Mullen, '86  
Todd Sjoblom, '75  
Kim Sklar Reichelt, '88  
Carl G. Bespolka, '83  
Sharon A. Els, '88  
Donna D. Mayo, SM '93  
C. Keith Eubanks, SM '94  
Kathy K. Allen, SM '93  
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of several more of our classmates. We have received notice from his daughter, Judith, that **George E. Brennan** died on July 27, 1987, almost 10 years ago. He apparently studied architecture at MIT in the late '20s but did not complete the requirements for a degree. . . . **Constantine Orfanos** died on December 5, 1995. He was born in Greece, came to this country as a teenager, and studied electrical engineering at MIT. According to my records he did not complete the requirements for a degree, although he later apparently obtained a master's degree from Harvard. He worked for many years as an electrical engineer for GE International. He is survived by his wife, Helen, a son, and two daughters. . . . **Margaret Van Pelt Vilas** died in September 1995. She received her undergraduate degree from Vassar, a B.Arch. from the Columbia School of Architecture, and an M.A. from MIT in 1930. During WWII she worked as a draftsman, renderer, and tool designer. After the war, she established and maintained an office in New Haven, Conn., where she worked as an architectural designer and self-employed architect. In later years, she remained active as a water-colorist and "half-time" painter. She and her husband, who died in 1988, were avid small boat sailors on Long Island Sound.—**Gordon K. Lister**, secretary, 5707 Williamsburg Landing Dr., Williamsburg, VA 23185

# 31

The Class of 1931 made quite a showing for its 65th Reunion at Tech Week, 1996. Not the least of accomplishments was the election of new class officers, nominated and voted into office at the class dinner on June 7. **John Swanton** prepared the slate: president and treasurer, **Ben Steverman**; secretary, **Albert P. Sims**; assistant secretary, **H. Sheldon Smith**; and class agent, **Edmund Blake** with **Eugene Branca** (retiring agent) assisting. Our heartfelt thanks go to the retiring officers for their many years of service: president, **C. Randolph Binner** (deceased February 13, 1996); secretary, **Wyman Boynton**; class agent, **Gene Branca**.

**Ben Steverman** writes with an update on all the folks who attended the 65th Reunion. . . . for **Ed Blake**, "Good luck to a willing class agent!" . . . **Gene Branca** is now residing in Quincy, Mass. He is widowed, but continues to enjoy good health. . . . Although **Charles Broder** was expected, he wasn't able to make it; **Ben** passes on, "He was missed." . . . **Norman FitzGerald** from Abilene, Tex., was "vibrant and healthy." He is a veteran reunion attendee; good to see him, although sad to learn that he is recently widowed. . . . **Leo Green**, "always happy and full of enthusiasm" was sorry to miss seeing **Charley Broder** and **Leon Kolker**. . . . From Pinehurst, N.C., **William C. Kay** came with his wife, **Eileen**. It was his first reunion!, and he was a "real addition." He earned a master's degree from Tech in '31. **Leon Kolker** and **Betty** have been a longtime, faithful reunion couple. At the last minute they had to cancel due to illness—we hope all is better with the turn of the summer months. . . . **George Manter** and **Katherine** continue to call Hudson, Mass., home.

Fall River is home for **John J. McNiff** and his wife, **Frances**. They, too, are longtime reunioners, but **Frances** was unable to come

this year because of illness. . . . **Mrs. Albert R. Pierce** and her son, **Edward**, were a "delightful addition to the group." Husband "**Russ**" died in 1973. . . . **John A. Shute** and wife **Bobby** came from Washington, D.C.—"It sure is good to see old friends." . . . **Albert R. Sims**, our new secretary, being a longtime '31 enthusiast, is sure to be the man for the job. "Good luck, Al!" . . . **Arthur A. Smith** and **Robert P.** were registered for reunions, but didn't come—so sorry! It is always a pleasure to be with **Shel (H. Sheldon Smith)** and **Harriet**. **Shel** is our class encyclopedia of information way back to undergraduate days."

About himself and his wife **Clare**, **Ben Steverman** writes, "Nuff said." Going on, **Ben** writes, "**John (Swanton)** is our rock solid citizen and a joy to call a friend. Unfortunately, **Louise** couldn't make the trip from Maine." . . . "**John (Olsen)** and **Laura** had signed up for the whole reunion but last minute illness caused cancellation. We missed their company because of memories of past reunions and happy memories in general."

We are sorry to report the following deaths. **Edward B. Hubbard** of Weston, died April 11, 1996. During WWII, he served in Australia for the MIT's Office of Scientific Research. He was a sales representative for Coffin & Burr, now Advest, Inc., for 50 years until his retirement in 1983. He leaves his wife, **Charlotte (Batchelder)**; two daughters, a brother, and five grandchildren. . . . **Donald A. Holden**, of Charlottesville, died November 12, 1995. **Donald** began his career at the shipyard as a draftsman in 1934. The civil engineer succeeded the former president in 1964 after a series of company promotions. He served as president for five years and continued as chairman until retiring in 1970. In 1970, **Donald** became the executive director of the Council Of Independent Colleges in Virginia, retiring in 1983. **Donald** was an asset to his community and held numerous other positions including president of the Society of Naval Architects and Marine Engineers from 1967 to 1968 when he was awarded the Vice Admiral **Jerry Land Medal** for "outstanding accomplishment in the marine field." Survivors include his wife, **Eleanor Watson Holden**, a son and daughter-in-law, and two grandchildren.

**Samuel S. Arlen** of White Plains, N.Y., died March 22, 1995. **Samuel** was an architect for over 50 years. He designed public buildings for New York City until he went into the U.S. Army during WWII. The Reptile House at the Bronx Zoo was one of the most famous buildings he designed. Soon after the war, **Samuel** became a prominent architect in New York. When he retired six years ago, he and **Ethel**, his wife for 62 years, moved to Key Biscayne. Besides his wife, **Samuel** is survived by a daughter, a brother, and two granddaughters. . . . **Maxwell Parshall** of Hamilton died January 30, 1996. From 1932 to 1969, he was a member of the civil engineering faculty at Colorado State University. He was well loved by his many students, inspiring many of them to continue in the engineering field. He also ran the national weather station at Fort Collins for almost 40 years. In 1983, he received the engineering dean's Distinguished Service Award from Colorado State University. In 1969, he and his wife, **Mary**, retired to Bitterroot Valley, where they both enjoyed fishing and hunting. Surviving are his wife, a daughter, and a





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granddaughter. . . William F. Robinson, of Houston, Tex., died May 21, 1995, of whom we have no further information. Our condolences go out to all family members of these classmates.

As these notes are written in June, on the heels of reunions, Ben Steverman and the Review staff have collaborated to put them together. Your new secretary is eager to receive news from all '31ers at the following address.—Albert R. Sims, secretary, 1727 Bayshore Dr., Englewood, FL 34223-1507

## 32 65th Reunion

Technology weekend came. The weather was good. The schedule of events was well organized. I especially liked the Saturday morning program about the future—the problems of population growth and pollution stand out in my mind.

John Brown, our class president, had a class meeting in the afternoon. Those present were: John Brown, Al O'Neil, Melvin Castleman, Tom Weston, and Don Brookfield. Elizabeth Simons of the Alumni/ae Association helped us plan for our 65th Reunion next year. John Brown will act as treasurer because Arthur Marshall felt he must resign because of his two recent back operations.

Tom Weston and Al O'Neil will be the co-chairmen of the 65th Reunion. Russel Robinson will be our class agent, replacing Ed McLaughlin, who recently fell and broke his ribs. Don Brookfield will be the chairman of our nominating committee. Our treasury is low. Our class dues for reunion will probably be \$32. Those that can send an extra donation will be encouraged to do so.

John Brown called for a minute of silence for our classmates reported deceased from April 3, 1995, to March 31, 1996: Charles H. Behse, Jr., Lawrence C. Berk, Frank S. Chaplin, Willard H. Foster, Robert A. Hanners, George B. Hoadley, William V. Kaeser, Philip E. Keene, John T. Kelton, William A. Kirkpatrick, Alfred A. Mulliken, Charles H. Pierce, Herman G. Protze, Stanley S. Rudnick, William E. Skelton, Charles H. Taylor, Raymond K. Thompson, and Adolph Warsher.

We have received some obituary information concerning our classmate Willard Haskell Foster, aged 84. He died on January 9, 1996. He was a reserve officer in the Army Corps of Engineers during World War II. Foster retired from the corps as a brigadier general. He lived in Sudbury, where he served as a selectman and was an industrial engineer for General Motors and a plant engineer at Microwave Associates in Burlington. He ran his own professional engineering consulting firm in Sudbury. He was active in boating, belonging to the Cape Cod Power Squadron and the Coast Guard Auxiliary. He was a past commander of both organizations and also was a member of the Monomoy Yacht Club. He is survived by his wife, two daughters, one son, and four grandchildren.

Bob Thompson informs us of another Thompson classmate death: Stuart Miller last April 2 at Mt. Lebanon, Pa. Stuart served with the OSS, predecessor of the current CIA. He spent much of his professional life with one of the big insurance companies evaluating fire

risks for their customers. He leaves a widow, Gertrude.

Thanks for your notes, Bob, and your comments!—Melvin Castleman, secretary, 163 Beach Bluff Ave., Swampscott, MA 01907

## 33

A drink from a fire hydrant was the underlying theme served up to us happy campers at Reunions this year. Thursday was Tech Night at Pops, which, as always, featured an MIT personality: Pamela Wood, a lecturer in music. She sang "Oh, What a Beautiful City" as well as I have ever heard it sung. Bill Huston reminded me that our favorite percussionist, Fred Buda, could be heard when called on, particularly in the "Colonel Bogey March." Friday was left to Commencement viewing or tours, such as the MIT Media Lab, Boston Harbor, or—my own personal choice—a bus tour to Concord and Lexington for a refresher course in Colonial history and literature. I particularly enjoyed a stop at the home of Ralph Waldo Emerson, where he spent the first two years of his marriage. After the tours, our Class went to Bartlett's in Charlestown for our annual confab and lobster fest. There were 13 of us, including guests and [Alumni/ae Association staff member] Elizabeth Simons, who had arranged for the lunch and a tour of Charlestown Navy Yard, including the U.S.S. Constitution. The business meeting was all about you guys who weren't there for one reason or another. John Longley said that Harry Steinman was excused because of a conflicting squash tournament date. Ed Atkinson and I sure missed seeing you, Harry. That evening, there was a dinner with faculty that I passed up.

Instead of being on Friday, Technology Day was on Saturday, June 8. I attended the Memorial Service, and then the Kresge Auditorium speakers gave us ideas about what the future holds. (There is a report on Tech Day elsewhere in the MITnews section.) The luncheon in the Johnson Athletic Center featured the five-year class reunion gift reports. It was a \$36 million year for reunion giving—a record year. That announcement precipitated an outburst of applause louder than any I have ever heard at a Tech Day luncheon.

Later that afternoon, there were panel discussions, including one on "How Will Fortunes Be Made from the New Technologies?" Of all the Saturday events, what I considered most exciting was the first-ever Cardinal and Gray Dinner and Sing-Along, held at the Faculty Club. When our pianist asked if anyone there knew the MIT Stein Song, I responded. And when asked to do another number, I did like Tony Bennett with "I Left My Heart in San Francisco." The Class of 1931, on hearing the commotion from the adjoining room, then joined us for singing "I Wish That I Were Back Again at the Tech on Boylston Street." It was about 10:30 p.m. when we last stragglers showed each other out.

Of the 15 Reunion registrants, the fairer sex were represented by six: Jeanna Bachli, Doris and Andrea Julian, Selma Goldberg, Ida Simpson, and Sue Wall. . . Among the newcomers to the most recent Reunions, Stephen Rhodes seemed thankful that he had nominated yours truly, a quite unknown classmate, as the new Class Secretary at our great 60th Reunion. . .



**Samuel Wall** and I had fond remembrances of a football punter, "Pish" Ellis, who was the sensation of the 1930s at Medford High School. Like me, Sam Wall lived in Roxbury, although he went to Somerville H.S. At MIT, Sam was a three-sport athlete in hockey (varsity 2, 3), track (all 4 years) and in class baseball (4 years), and he says his ultimate ambition was to have made it in major-league baseball.

Among the most faithful at our reunions is **Leonard Julian**, our very own lieutenant colonel and class vice-president. Leonard usually accompanies Doris to Reunions, and this time around he also introduced us to his charming daughter, Andrea, who revealed a passion for singing with choral groups. . . . **Ed Simpson** was there, with Ida, of course. I am reminded of the time when the 4th year architects beat the 5th year bullies in football by the score of 12 to 6. Ed was in the backfield while I played in the line. That was then! . . . Arranging to meet at Pops beforehand with **Meyer Shnitzler** and **Selma Goldberg** meant a renewal of friendship that persists all year. . . . **Werner Bachli**, our Class Treasurer, was on hand with his wife, Jeanna, and **Wilber Huston**, Class President, had a few remarks about his trip to Israel last March with his clergyman son and his wife. Bill traveled throughout Israel, but said that his six days in Jerusalem were the high point of his visit, since he experienced walking through the same city gate that Jesus had often passed through. After Bill flew back from Tel Aviv to Newark, he had a long layover at the Edison Laboratories. His illustrious career included working there in 1929 and again from 1933 to 1937.

As recently as the May/June TR, I reported that **Thomas F. Galvin** had been hospitalized with a rare blood-vessel disease. The news of Thomas Galvin's passing on April 11, 1996, came from his only daughter, Patricia Galvin Kane, writing to **Herb Grier**. Tom Galvin was a construction superintendent for the Reading, Mass., firm of Thomas O'Connor before and after WWII. Tom had married his wife, Rita, in 1941, just before entering the service, and he had left the service with the rank of major in 1946. In addition to their daughter, they had two sons. Tom's activities were with various town committees and the Reading Symphony. Patricia reports that her father was eminently proud of MIT and that he was buried in his 50th Reunion red jacket. A picture in the 25th Reunion Classbook dating back to a Course XVII weekend in June 1932 shows Tom with the late **W. Cooper Cotton**.

At the 63rd Reunion, several classmates advised me of the passing of **Jack Adelson** (EE:6:SB) in a Chestnut Hill (Mass.) Nursing Home. I learned the following from the the obituary that appeared in the *Jewish Advocate* and from the 25th and 60th Reunion Classbooks. Jack was born in Boston's West End and graduated from English High School. He began the A. White Furniture Co. almost immediately after graduation, and when he retired from the business, he established the Sarah and Jack Adelson Scholarship Fund. Jack was a life member of Temple Mishkan Tefila in Chestnut Hill and served in the West End House Alumni Association. As a first lieutenant during WWII with service in the European Theatre, he earned a Bronze Star. In 1949, he married Sarah Ring (now deceased) and they had two daughters, Robin Little of

Ann Arbor, Mich., and Sharon Diamond of Newton, Mass. Jack loved music, as exhibited by his collection of classical recordings and his attendance for at least 45 years at Boston Symphony and Tanglewood concerts. Judging by the numerous classmates who informed me of Jack Adelson's passing, I am sure he was not only loved, but was a great credit to the community at large. . . . I have been advised of the deaths of **Gertrude E. Ebbeson** as of August 22, 1988, and of **Charles Keller, Jr.**, on April 10, 1996, and I am awaiting further information and/or obituaries.

I am, as always, **Berj Tashjian**, secretary, 1245 Briarwood Ln., Northbrook, IL 60062-4556; tel: (847) 272-8683.

## 34

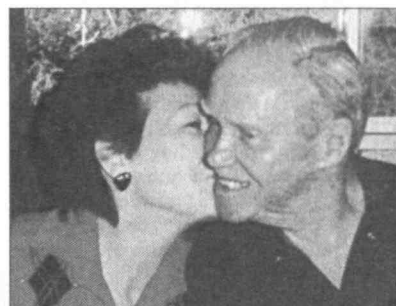
First, the bad news. The Alumni/ae Office has forwarded us news of the passing of four classmates this month. Unfortunately there were no obituaries included, but we will try to fill in as much background as we can. This is the first news we have had that **Frank Faillace (IV)** died on March 26, 1988. He practiced architecture in New York City and then retired to Delray Beach, Fla. He is survived by his wife. . . . **William Walker Bartlett's** niece, Cynthia Campbell, writes: "My uncle, 'Doc' Bartlett, passed away in November 1995 after spending some time in a nursing home in Newport. I know he looked forward to hearing from the students he benefited as well as about the reunions at MIT." He had established the Dr. William W. Bartlett '34 Scholarship. "This scholarship fund was very important to my uncle, and as his niece I am glad to see that the fund is accomplishing his objectives in education for Christine Hung and Kristy Bellamy." Bill was a physical scientist at the Naval Underwater Systems Center at Newport, R.I., the executive secretary of U.S. Naval Undersea Warfare Research and Development Planning Committee, and an advanced undersea warfare systems analyst. He was the inventor of numerous unique measuring systems and held four patents in this area. He was a volunteer tutor of high school and college students in mathematics and physics.

**John D. Moomaw (V)** died in July 1995. He had been a chemical engineer at Dupont, and was living in Ridgefield, Conn., at the time of his death. He is survived by his wife, Lucille, and a son, Christopher. . . . **Ted Kresser** died in January 1996. Ted and Rosemarie were regular attendees at our Reunions and particularly Mini-Reunions. They were usually the couple who traveled the greatest distance to the latter, coming from Orange, Tex. Ted had had heart problems for many years, and in the last years of his life he was extremely frustrated by his loss of memory. He apparently would drift in and out of this state, which added to his frustration. Ted had been a plastics engineer at Gulf Oil's Petrochemicals Plastic Division. He was the author of "Polyethylene," the acknowledged primer for people in the plastics industry. The class's sympathy was personally expressed to Rosemarie.

A card from **Ed Asch** on his return from California, and he reports the births of three new grandchildren. . . . **Ted Lucas (VIII)** accompanied his annual contribution with this note: "I'm almost retired, but still writing

# ClassNotes

most of the material for *Flat Panel Display News*, published in San Francisco. Also plans for two more books, one fiction. My wife, Joan, and I love our ocean-front home despite 100-plus MPH gales, not uncommon on Oregon's beautiful rocky coast." . . . **Foster Jackson (IV)** sends word that his health is good and his wife is fine. Living in Claremont, Calif., they take occasional trips to Las Vegas. He keeps in trim by maintaining his home and office. He is still interested in



*Florence & Foster Jackson, '34*

doing architectural projects, and reads constantly, to keep up with the federal, state, county, and city bureaucratic jungle. He is the author of *Laws and Principles of Design in Architecture and the Arts*, and writes a weekly newspaper column, "The Architect Speaks." He is listed in *Who's Who in Commerce and Industry* and *Who's Who on the Pacific Coast*. In his career, Foster has worked on 483 projects with a total value over half a billion dollars.

**Peter Kalustian (SM)** writes: "I continue to be very active with my international consulting business in the field of processing fats, oils, and fatty derivatives. This area has been my principal professional interest for many years. I still enjoy downhill and recreational skiing. This past season, I skied 50 times locally as



*Peter Kalustian*

well as in Utah and Colorado. In my age group of 80-plus, I always manage to place first or very close to it in racing." Peter reports that his daughter and her family live next door, and she assists him in his practice as well as taking excellent care of him. His college-age grandson and granddaughter are excellent downhill skiers and he loves skiing with them. He has traveled as far as the Philippines in his consulting business. He also enjoys motor boating in addition to skiing. . . . **Charles (Fred) Barrett III**, writes that his "present activity is to arise each morning, and as Uncle Walt in the comics said: 'I don't buy any green bananas!' We look forward to our trips north in May (five months in the Adirondaks)



and south in late October, to and from Speculator, N.Y." Fred and his wife, Lee, exchange visits with their four children, eight grandchildren, and seven great-grandchildren, who have homes in Boulder, Colo.; Tucson, Ariz.; Shrewsbury, Mass.; and Tappan, N.Y. Fred's and Lee's last overseas trip was to the Galapagos and Ecuador. Fred's favorite hobby is crossword puzzles, and he enjoys hiking as well, supplemented by a ski machine in inclement weather. He and his wife regularly provide transportation for a blind couple when they are not traveling.

Elizabeth Scheu Close (IV) writes that her health is good, as is her husband's. They have three children, four grandchildren. She keeps busy with her hobbies—painting and playing the cello—and she and her husband visited Italy in 1992 and Egypt in 1993. She has been working doing small design jobs for relatives and friends, reads constantly, and exercises regularly. She rarely sees any classmates, but did marry Winston Close, '35 (IV). . . . Frank Feeley (II) writes that while his health is good, he is bothered by failing eyesight. Frank is widowed and has one child and two grandchildren. He is still consulting on

industrial power systems, and his hobby is following the weather. . . . Dick Sanders writes: "I am living in a retirement community in Orlando, Fla., as my daughter Lynn lives not too far away. Living alone in our house at Vero Beach was too much. I can still drive and will visit with a couple (he's from the Class of '24) in Delray Beach and perhaps have lunch with with a former neighbor in Pompano Beach. Don't particularly like summers in Florida, but have no specific plans to leave as yet. Have my Annapolis house up for sale."

Technology Day occurred on a Saturday this year. (A commitment by your secretary to number-three granddaughter to attend her first piano recital prevented his attendance. A four-hour round trip to hear this future virtuoso play for two and a half minutes was worth every minute of it.) Class President John Hrones and Vice-President Russ Hastings represented the class. Classmates should plan to participate in the annual spring luncheon on May 6, 1997. This was originally the reunion-committee luncheon, but it has been expanded to include all comers, and the date has been moved back to make it possible for more

snow-birds to attend. The location is still open—there will be more information in a later column. Greetings to all. See photos this page of attendees at our luncheon last spring.—Carl H. Wilson, secretary, 48 Druid Hill Rd., Newton, MA 02161-2023.

# 35

We regret to report the death of Prescott A. Smith from a massive stroke on April 19 in Concord. He graduated in Course II. During WWII, he was the sole engineer at the

Hemphill Company in Pawtucket, R.I., where his work earned the Army-Navy "E" for his company. Prescott then returned to the Institute as a faculty member in the Department of Mechanical Engineering, maintaining the tradition established by his memorable predecessors T-Square Smith and Slave-Driver Smith, though, as far as we know, he apparently never received such a distinctive alias. He and his wife, Eloise, served as housemasters on the MIT campus in 1966, but their permanent home was in Concord. Prescott taught an evening class at the Lowell School for many

years, even beyond his retirement as professor emeritus in 1979. He was a life fellow of the ASME and published a number of technical papers. Being located at our alma mater, he and Eloise were fair game to serve on class reunion committees, as many of us will recall. In addition to his wife of 56 years, he is survived by a daughter. Contributions in his memory (as indeed for any of our classmates) may be made to the Class of 1935 Memorial Scholarship Fund.

We report also the passing in Peterborough, N.H., of Charles E. Ware, who joined us for our senior year as a special student in Course X. A graduate of Harvard in '34, he worked for the U.S. Rubber Co. and later for Horton &

Hubbard Co. in Nashua. He leaves his wife, three daughters, and a sister.

The good news is that Leo H. Dee has accepted the position of class agent. That surely also means that we can count on Janice to lead the singing at our next reunion.

Memories of Allan Mowatt have continued to surge. In our earlier column, we didn't mention his highly successful organization and conduct of the annual class golf tournament, nor his lifelong devotion to choral singing.

Please send news about yourself and family to either Walter H. Stockmayer, acting secretary, Department of Chemistry, Dartmouth College, Hanover, NH 03755-3564; tel: (603) 646-2503; fax: (603) 646-3946; e-mail: <walter.stockmayer@dartmouth.edu>; or Thonet C. Dauphine, president, 57 Alcott St., Acton, MA 01720-5540; tel: (508) 263-3494



*CLASS OF '34 SPRING LUNCHEON: (above, lower left) Bill Ball, Larry Stein, top of Mary Hastings's head, Norm Krim, George Gahm (right rear), Gudrun Gahm, Carl Wilson, Mollie Wilson, Jeri Stein, Al D'Arcey, and Earl Lockhart. (Below, from left) George Gahm, Gudrun Gahm, Carl Wilson, Mollie Wilson, Jeri Stein, Helen Lockhart (at end of table), Bill Ball, Mary Hastings, Norm Krim, Ernie Massa, and Frankie (Lou) Frank;*







*Peter Weinert, '36, and one of his gaff-rigged schooners*

# 36

Our pro-tem assistant secretary for reunions, **Fletcher Thornton's** wife, Peg, writes of the ladies' appreciation for the special attention they received, beginning with President Alice's invitation to 110 widows. A number responded with regrets, but seven were present: Kitty Borden (Herb), Rosalie Chapper (John), Florence Cooperstein (Ben), Rose Dashefsky (Ed), Margaret Nyquist (Arthur) and their daughter Anne, Ruth Wallace (Milner) and their son David, and Dorothy White (Peter). Typical of our guests' reactions: "Every day was interesting." Quoting Peg: "We were knee-deep in nostalgia, of course, and enjoyed the excursions—to Blue Hill Observatory, the 1636 Fairbanks House, the boat ride, and gigantic Yellowstone show at the Museum of Science. We liked being called 'pretty girls' by the photographer, and were happy to be invited to the class meeting. We are especially grateful to Eli Grossman for producing a robust class treasury over the years, enough to accommodate the widows and serve cocktails to all, gratis. Thank you, Class of 1936, and hats off to Alice Kimball, who arranged it all."

The opening buffet dinner Tuesday, June 4 at the Dedham-Hilton featured six brief talks: **Bernie Vonnegut** on lightning charge formation; **Ollie Angevine** on innovation of present day necessities over our last 60 years; **Darby Merrill** on personal philosophy; **Dorian Shair** in expanding on the Russian icebreaker trip to the North Pole and on keeping R&D alive by always questioning inherent assumptions; **Pete Weinert** on building a Chippewa birch bark canoe; and **Ken Winsor** on sculpting human

and symbolic works for European, Middle Eastern, and American clients over the past 30 years. One of the highlights was Pete's model (scale 1 inch to the foot) of the canoe, from which he and wife Jean learned mistakes to avoid in building the real thing. He also showed Indian tools and pictures of the entire process and the community turnout for the launching. Readers will recall that Pete has built models of old sailing ships (November/December issue), one of which is pictured here.

Ex-president and retiring chairman of the MIT Corporation, **Paul Gray**, honored our Wednesday banquet to speak of the great accomplishments of technology over recent decades, and the work to correct unintended fallout from some strides forward. Responding to a tribute to him and President Vest for withstanding the Justice Department's attempt to undermine our widely copied method of awarding scholarships based on need, he gave some details and the suit's cost to MIT in time and dollars—enormous.

The class meeting re-elected president **Alice Kimball**, treasurer **Eli Grossman**, and me as secretary. **Walt MacAdam** was elected vice-president, replacing **Ken Arnold**, who wished to retire. **Fred Assmann** was confirmed class agent, and **Roman Ortynsky** appointed assistant secretary.

Thursday's Pops concert was a standing-ovation hit. The conductor tuned in with

## ClassNotes

humor directed to the Tech audience, and soloist **Pamela Wood** rendered classical and modern arias with a professional voice that has been heard with symphonies worldwide—at MIT she is a lecturer in music.

Our hoped-for crew reunion eight was decimated by recent deaths (**Herb Borden** and **Henry Johnson**), influenza, arthritis, a leaky 20-year-old aorta inner tube (**Ken Winsor**), and other problems. But we fielded (or launched) a four: **Bill Nichols**, **Fred Noyes**, me, and **Linda Muri**, '85. This was enough age to draw two press photographers in the launches, and the *Boston Globe* carried an up-close action picture Saturday morning. The row was preceded by the dedication of Ken's oarswoman bronze statue in the boathouse lounge, a lovely work with eyes in the archaic Greek style.

The Technology Day lunch program booklet recognized class presidents and reunion gift chairs by name, and from results posted on other pages, **Harry Essley**, **Henry Lippitt** (deceased March '94), and **Fred Assmann** were the most successful ever for a 60th Reunion class. During the five years ending at June 1, they raised \$13.5 million (an all-time record), and we were second highest in classmate participation—80 percent. Only the Class of 1926 exceeded in the latter with 98 percent. The Class of 1923 holds records for 65th and 70th total amounts, but we have ten years to go!

Our total classmate attendance was possibly equal to the 55th, notwithstanding casualties and three last-minute cancellations. There are 32 classmates in the Thursday morning photograph and 22 wives and two widows. There were a dozen classmates registered who had been relatively quiet for five years or more. Two could respond at once to my bugging



*CLASS OF '36 CREW REUNION — On the Charles, from left: Frank Phillips, Bill Nichols, Fred Noyes, and Linda Muri, '85. Inset: Nichols, Muri, sculptor Ken Winsor and his bronze oarswoman, Phillips, and Noyes.*



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with something in writing, and the rest promised the same soon, hopefully for next issue.

The frequently asked question as to the number of our graduating class alive today is not easy to answer. Some have disappeared from mail or telephone contact. Others graduated in a later year and did not request continuance of their '36 affiliation. However, of 688 men and women, considered by Alumni/ae Records in 1986 to have been undergraduate or graduate members of 1936 for one year or more, 393 were known to be deceased in June 1996. Looking at the most recent printout (1995) of known addresses, and accounting for recent deaths, perhaps 265 are alive, or 38 percent of the 688—not bad for octogenarians!—**Frank L. Phillips**, secretary, Van Beuren Rd., Morristown, NJ 08960; tel: (201) 267-0299; **Roman L. Ortynsky**, assistant secretary, 100 Pinegate Rd., Peachtree City, GA 30269; tel: (770) 487-6704

## 37 60th Reunion

Attending Cardinal and Gray and Technology Day events last June were a number of class members, including **Bert Bennis**, **Win Comley**, **Joe Heal**, **Ed "Hobby" Hobson**, **Mel Prohl**, **Dick Young**, and **Len Seder**. They reported that they enjoyed the events and look forward to next year, when we will be celebrating our 60th. . . . Joe has sold his house in Florida and moved to Mystic, Conn., where his wife is in a nursing home. He spends his days and eats meals with her. I know we all feel for him. . . . Hobby continues his breakneck pace, flying all over the country. His company, Abanaki, is expanding to twice its size. . . . My apologies to classmate X, whose name I cannot retrieve. He says he is looking for potential residents for a retirement community to be built in Wolfeboro, N.H., where he expects to be a resident. Please write, Mr. X, and I shall terminate your anonymity.

**Fred Altman** recently retired as senior scientist at Computer Sciences Corp. He recently returned from France, and boasts: "I found a hotel with a one-star restaurant for only \$68 a day. The room wasn't much, but the food and sightseeing were great. My son has been invited to MC at the new Disney Institute—the \$35 million, 58-acre serious resort at Orlando!" . . . **Bob Glancy** brings us up to date: "My older daughter, who lives in Colorado Springs, is coming to celebrate my 81st birthday at our cabin in Meredith, N.H., along with my younger daughter, Sharon, who lives near me in Stroudsburg." His further comment certainly needs to be quoted, even if it is self-serving: "When I receive my *Technology Review*, I always read the '37 Notes first. Keep up the great job you both are doing. Regards to all '37ers."

We have more on the life of **J. Robert Ferguson, Jr.**, whose death was reported in July. According to the *Sewickley* (Pa.) *Herald*, he had a long career at U.S. Steel, where he started in 1940 as a project engineer, became executive VP for engineering and research in 1974, and was appointed senior VP and assistant to the president in 1979. He retired from this position in 1980. He was the first president of

Valley Care Nursing Home and served on its board from 1980 until his death in January 1996. He was on the board of the Sewickley Valley Hospital and Mon Yough. Bob is survived by his wife, Dorothy, a son, a daughter, and four grandchildren.

Another illustrious classmate has passed away. **Edwin A. Kass**, who had a remarkable career as a sanitary engineer, was involved for 49 years predominately in the supervision, engineering, and design of environmental pollution abatement projects in the U.S. and many foreign countries. These related to solid and liquid waste, air, and noise, particularly for power generation and industrial facilities. At various times he was involved in water management studies, field investigation of water pollution, master planning for water and wastewater facilities, as well as engineering and design of water treatment plants and pioneer efforts in industrial waste treatment. During WWII, he was a captain in the Army and practiced his skills in Japan. He supervised environmental sanitation; rehabilitation of water supply facilities in gumma prefecture; typhus control in Tokyo during the 1946 epidemic; and trained Japanese personnel for the work, supervising some 2,500 Japanese involved in this program. Thanks to Norman Krim, '34, former roommate and close friend, for this information. Our sympathies are extended to Edwin's wife, Ann, and the members of his family.

We have received word, without details, of the death of **Robbins H. Ritter**, of Roseland, La.—Co-secretaries: **Leonard A. Seder**, 1010 Waltham St., 342-B, Lexington, MA 02173; **Robert H. Thorson**, 66 Swan Rd., Winchester, MA 01890

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Twenty-five attended our mini-reunion Friday, June 7, in Waltham. Some had attended the graduation exercises earlier in the day, and a number went to Cambridge for

Technology Day on Saturday. **Ira Lohman** and **Louise** had come from Cupertino, Calif., and were en route to London to begin a Baltic cruise via Hamburg and the Kiel Canal with port visits at Copenhagen, St. Petersburg, Helsinki, and Stockholm. **Dale Morgan** and **Janet** were headed to another reunion at Middlebury, Vt., from their home in Charlestown, R.I. **Paul Des Jardins** and **Madelyn** came down from New Hampshire on their way back to McLean, Va. **Harry Saunders** planned a stop at his farming properties in Illinois before returning to his home in Seattle. Class President **Fred Kolb** was going to visit in Gloucester, Mass. **Frank Kemp** and **Ruth** had recently returned from Hong Kong, Bangkok, and Singapore plus an extended stay in the Santa Fe and Taos areas of New Mexico.

In addition to the above travelers, we had 60th Reunion Chairmen **Norman Bedford** and **Sol Kaufman** with their wives **Hilda** and **Sylvia**. Class Agent **Don Severance** and **Phyl** came down from New Hampshire. Class Chairman **Norman Levant** and **Muriel** were anticipating a four-day Olympic visit in Atlanta as guests of NBC.

**Ed Hadley** and **Jean** were honored for handling all the details involved in making the mini-reunion a success. Ed advises that he has unearthed a number of 50th Reunion Books



and a few 40th Reunion Books. His address is below, and if you will send five dollars for either one, or seven dollars for both, he will pack up and mail them to you as long as the supply lasts.

Among the happy throng was **Roy Hopgood** and **Alice**. Roy is still active as a patent attorney doing his best to protect the individual inventor from big corporation predators. Class Treasurer **Lou Bruneau** and **Sandy** gave the annual report advising us that we are financially sound at this point with a little money in the bank. All were especially pleased to have **Ina Gordon** join us at the reunion. Next year we will make a greater effort to entice our classmates' widows to be with us.

At our mini-reunions we have no speeches, just a few brief announcements and continuous good conversation. Before a moment of silence, **Fred Kolb** slowly read the names of the seven members of our class and the graduate student who had died in the past year, all of whom have been mentioned in our Class Notes.

During dinner **Harold Strauss** called from California asking to be remembered to all present. **Fred Kolb** announced the appointment of **Ed Hadley** as vice-president of the Class of 1938 to fill out the remainder of the term of **Paul O'Connell** who died a year ago.

**Vernon Winn** and **Nadine** attended a number of events in Cambridge. There was a full schedule with the Boston Pops on Thursday, graduation on Friday, and Technology Day on Saturday with its emphasis on the art of story telling, advanced in molecular biology, nano-structural materials, and information as a verb. The only disappointed people I ran into were those who went to the Coop at Kendall Square and found 80 percent of the floor space under renovation and only 20 percent stocked with merchandise for sale.

A note from Professor **Clark S. Robinson** of **Clyde Park, Mont.**, advises, "Rachel and I are doing well. I am still working on improvement of specialized ham radio antennas."

For those of you who live, winter, or take vacations in Florida, the Florida Gulf Coast MIT Mini-Reunion Group is planning a January 15-19, 1998, get-together at the Sundial Beach Resort on Sanibel Island near Ft. Myers. The committee has the notion that the "maturing bones" of the classes of 1937 through 1963 in particular would welcome an opportunity to make a mid-winter visit to sunny, subtropical southeast Florida. You'll be hearing more about this as planning matures.—**Paul R. Des Jardins**, secretary, 6251 Old Dominion Dr., Apt. 310, McLean, VA 22101-4807; tel: (703) 534-4813; **G. Edwin Hadley**, vice-president, 50 Spofford Rd., Boxford, MA 01921-1504; tel: (508) 352-6040

# 39

**John Alexander** and **Nancy** celebrated the 50th anniversary of their wedding at a Carillon Point restaurant overlooking Lake Washington. They were joined by family members and longtime friends from Boeing Co., and made through their interests in ham radio, skiing, barbershop harmony, community activities, and sailing—including a 23,000-mile Pacific voyage on their 41-ft. ketch. Over the years, Nancy donated many hours to help

others prepare tax returns. Classmates attending the celebration included **Bob Withington** and **Betsy** and **Hal Seykota** and **Hilda**.

**Elihu Root III** and **Molly** live in Clinton, N.Y. Elihu was a pioneer in home computers. His first computer had only 1,000 bytes of memory. He programmed it in "machine language" only! In early June, Elihu entered a Clinton road race and excited admiration because he entered to ride in his wheelchair. Molly won the gold medal in the Croquet Championship at the New York State Senior Games held at Syracuse.

**Bill Wingard** and **Anita** live in a Catonsville, Md., retirement settlement that accommodates about 2,500. Two sons operate the machine shop business which, over 40 years, earned its reputation for high-quality, high-precision products. Another dividend from high-reputation assets created over Bill's career is its current invitation to make high-precision parts for a new type of valve to be installed on human hearts.

**Sil Silber** and **Jean** garden three-plus acres on their Lutherville, Md., estate. Their flowers attract visitors from the National Horticultural Society and the Pennsylvania Horticultural Society. Before he reached 39, Sid was president and led a corporation to generate net annual profit exceeding \$1 million. That qualified him for membership in the Young President's Club of USA. When he and his age peers reached 50, their eligibility to belong expired. These ejected achievers then formed a new club titled The Chesapeake Presidents Graduates Group of USA. About 80 of the combined Clubs' members met under a canopy over Sid and Jean's tennis court. At lunch there were speeches and comments about increasing assets. No record was kept of comments, if any, about increasing girths. With one or two other couples, the Silbers plan to lease a villa in Italy near Verona and make spur trips to enjoy northern Italy. Sid reports **Paul Stanton** and **Theodora** are among the first '39ers to have a great-grandchild.

The **Ryder Pratts** live in Scottsdale, Ariz., and travel often to their other homes strategically located on or near golf courses. For a time, **Ryder's** golfing was impeded. Then acupuncture enabled him to play nine comfortably.

**Arthur W. Curtis** recalls: "**Jim Barton** sat next to me in Engineering Drawing 101. After some time in construction, I went to work at Pratt and Whitney Aircraft where I stayed for 37 years. In 18 years of travel for PWA, I only visited its suppliers and never the users of its products. Jim went to Boeing, one of PWA's big users."

**Fred Schaller** and **Anne** write: "We reduced our workload by selling the home in Rhode Island, but the family still has one sailboat in the water, a 47-ft. Tartan. Its problem is that it goes too fast for fishing off the stern. At our Wellesley homestead, we continue supporting the South Natick Library and Historical Society and administering finances at our church. An extract from the introduction in a book titled, *In Search of Excellence* is attached. The authors relate extraordinary achievements of **Bob Withington** in designing the B-47 and B-52 aircraft at Boeing." I read the extract over the phone to Bob.

Bob, ever-modest, took exception to the effusive compliments in the extract. Bob summarized his participation in designing the two

# ClassNotes

aircraft. He said: "Boeing's successes on those two planes, and on all others, simply resulted from consistent applications of right thinking, over time, by teams of dedicated employees solidly supported by far-sighted Boeing management." For me, Bob speaks with more eloquence than the verbiage in the book's introduction.

**Joe Dana** and **Jean** and **Bill Pulver** and **Adie** plan to attend Cardinal and Gray activities in Cambridge during June. Joe and Bill had physical setbacks during the last three quarters. Each made a major recovery. Extrapolating convalescences, they may be on ski slopes again in January 1997. During June Week, Bill and Adie joined Roy Hayworth, '38, and Alice and Bob Blake, '41, and Mary for dinner and talked about undergraduate adventures shared at Phi Kappa Sigma.

**Seymour Sheinkopf** and **Sylvia's** prodigious effort produced a family genealogy chart that starts at the year 1750 and lists almost 1,100 names. Its companion 133-page book has pictures and biographies. Distribution was to 250 Sheinkopf families, some of whom attended two family reunions. Seymour and Sylvia started semi-annual publication of a family newsletter. Seymour writes: "We visited **Dave Frankel** and **Sally** in Boca Raton. Dave is recovering nicely from double knee replacement. **Art Zeldin** and **Helen** visited **Leo Kiley** and **Luna** in Santa Fe, N.Mex. **Aaron White** is less mobile these days and would welcome letters from classmates. To avoid summer heat and humidity in Maryland, Sylvia and I will head our trailer through Maine to New Brunswick and Prince Edward Island."

While being flown more than 300,000 paid air miles during career years, I never piloted a plane or dreamed I would try. In May 1996, the Seattle Club of MIT Alumni/ae invited members to tour Boeing's immense Integrated Aircraft Systems Laboratory (IASL) for a fascinating three hours. Gary Pankey, '65 AA, was program chairman.

IASL is used primarily to solve engineering design problems. "Black boxes" from aircraft wrecks can be examined and decoded. There are acres of equipment, cross-connected in a four-story building. There are flight deck simulators for Boeing's new 777, and its 767, 757, 747, 737, and 727 aircraft. Each tour member was invited to sit in the pilot's seat of the new 777 simulator. Its flight deck is a replica of the one in a 777 aircraft, which is two-thirds as long and wide as a football field and has takeoff weight of about 27 tons. In the five-minutes allotted, each of us was given an assigned "problem" on the simulator to solve—accessing and responding to information about flight conditions and airplane status.

My problem started at 3,000 ft. elevation in level flight. Through the pilot's window I saw we were approaching an airport. Its landing strip was almost centered in my window. My assignment was to land the 777 simulator safely within five minutes. At first, I overcontrolled (power-assisted everything moves 27 tons at fingers touch!) As I compensated, time passed faster than the 777 descended. There-



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fore, my 777 overshot the landing strip and I had it speeding safely up into the wild blue yonder when the supervisor touched a switch. That terminated my five-minute adventure. To others planning to "fly" a simulator, I would suggest the ideal is to be younger than 80 and otherwise-qualified.

After last year's tour inside a Trident nuclear submarine and this tour, we wonder what the program committee could arrange next to beat all that.

**Richards L. Loesch, Jr.**, made his career as a Boeing test pilot. He flew real aircraft for years before he retired in Seattle.

A mid-winter mini-reunion for classes 1938-41 was pioneered in 1995 and it evoked compliments. Another such is targeted for January 15-19, 1998, at Sanibel Island, Fla. To indicate what events and costs would be preferred for the Sanibel mini-reunion, '39ers may advise the Florida MIT Mini-Reunion Program, 1304 SE 22nd Terr., Cape Coral, FL 33990-4620, attention of Samuel Card, '40, co-chair.

We are saddened by news of deaths of two classmates: **Irving B. Finsen** died April 7, 1995. He is survived by his wife, Gita, who lives in Wayland, Mass. . . . **John Thomas Massengale**, PhD '39, died October 11, 1993, in West Chester, Pa. We have no other details.—**Harold R. Seykota**, secretary, 2853 Claremont Dr., Tacoma, WA 98407-2332

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By now, you will have received notice from Sam "Specs" Card with the questionnaire about the mini-reunion in Florida in January 1998. I trust that you have completed and returned the postcard so that Sam and his colleagues can proceed with their plans.

I received a letter today from past Class President **Norm Klivans** in which he expressed surprise at the extensive activity of some of our classmates as described in this column. Norm and Alice are planning to celebrate their 50th wedding anniversary in late October, with their children and grandchildren, in Tucson, Ariz., on a dude ranch. Norm comments that he and Alice will abstain from horseback riding, but they will swim, walk, and play tennis. Thereafter, they will return to Florida for the winter. Norm is excited about the multiclass reunion in early 1998 as he recalls the great time at the 1993 Florida mini-reunion.

A note from Class Treasurer **Dick Babish** dealt with financial business, requiring a signature to roll over a CD. Dick mentioned that two of his grandchildren had just graduated from college—David from Rensselaer and Christine from UNH.

A letter from Sam "Specs" Card reports the death of **William Wooster Merrill, Jr.**, on March 11, 1996. Specs recalls that Bill, or "Woo" as he was known in the fraternity, was initiated into Alpha Theta with 14 other classmates—a record at that time. Bill spent his entire active career, 33 years, as an aeronautical thermodynamics engineer with Lockheed in Burbank, Calif. He retired in 1974 after his last assignment on the L-1011 wide-body jet project.

From his attorney, the alumni/ae office received word of the death on November 23, 1995, of **Ernest Trowbridge Gregory**, of Alamo, Calif. He was a Course II graduate and had retired from Cutter Labs, Inc. There

is no further information.

Please keep those letters and telephone calls coming.—**Richard E. Gladstone**, secretary, 250 Hammond Pond Pkwy., 1205S, Chestnut Hill, MA 02167-1528; tel: (617) 969-5161

# 41

As we complete our 55th year since graduation and contemplate a gala reunion, we are notified by families, friends, and MIT of four of our compatriots who did not make this

milestone that the rest of us were fortunate to achieve. We express our sincere sympathy to their families.

**Clifford Hitchcock Hahn** passed away on April 8, 1995. He was listed in our 1941 *Technique* as Course II, a member of ASME, SAE, and Voodoo. His career from MIT *Alumni/ae Registers* include positions as sales engineer for Otis Elevator Co. in Boston and Badger Mfg. Co., Cambridge, and sales manager for Eastern Refractories Co., Belmont, Mass. His wife, Priscilla, continues to reside at 38 N. Brasse Way, North Reading MA 01284-3411. . . . MIT also reports that **William August McKenney** died on June 26, 1995. His wife, Marion Jane, provided details of his career. During WWII, he was a captain in the Army and by 1955, as a civilian employee, became chief of the Toxic Chemical Warfare Branch, Office of the Chief Chemical Officer, Washington, D.C. In 1961, he was a food technologist for the F. W. Greer Co. of Wilmington, Del. By 1967, he had been re-employed by the government at the U.S. Navy Surface Weapons Center, Dahlgren, Va., retiring as head, Chemical and Biological Sciences Division in June 1975. After his retirement and the death of his first wife, he moved to North Carolina in 1976. In addition to his second wife, Marion Jane, he leaves a son, a daughter, three brothers, a sister, and four grandchildren. Marion Jane continues to reside at 55 Banner Farm Rd., Horse Shoe, NC 28742-9702. . . . A note from his wife, Jacqueline, passes the sad news that her husband **Alfred B. Booth** died of acute leukemia on February 1, 1996, after a long illness. At MIT, Al was a member of Course IX-B (general engineering). During WWII, he served as a lieutenant in the U.S. Navy. A resident of Westport, Conn., for 32 years, Al had retired as executive VP and senior consultant, for Warnaco, Inc. Previously he had been corporate director of product operations, Staff Office of the President, ITT, and had served as the corporate director of manufacturing for the Celanese Corp. Al's voluntary positions were also impeccable, including advisory board for the University of Maryland Department of Human Ecology and the Philadelphia College of Textiles and Sciences. He was also a longtime volunteer for the Westport-Weston Chapter of the American Red Cross. Al is survived by a son, a daughter, two grandchildren, and his wife, Jacqueline, who continues to reside at 17 Harding Ln., Westport, CT 06880. He was predeceased by another son.

Colonel **George Weinbrenner**, USAF retired, '40, SM '41, sends a note from San Antonio, Tex., and encloses an obituary, and the sad news that **David S. McNally** died on May 13, 1996. His wife, Anne, confirmed this in a note a few days later. We remember Dave, Course XV, as an active member of our class at MIT,



including president of the Army Ordnance Association and track and football, as well as numerous committees and memberships. He was called to military service in July 1941 as a 2nd lieutenant, U.S. Army (Aviation Ordnance), and was discharged in March 1946 as a lieutenant colonel ordnance officer of the VI Air Service Area Command in the Asiatic-Pacific Theater. He held many important industrial management positions in his subsequent civilian career for Packard Motor Car Co., Studebaker-Packard Corp., ITT Corp., Amphenol-Borg Electronics Corp., and Coleman Cable and Wire Co. He retired as VP and general manager of Right Away Foods Corp., McAllen, Tex., where he designed, built, and operated the first successful MRE (Meals, Ready to Eat) assembly plant where over 60,000,000 meals were produced for the Armed Services. During his career, Dave was considered an expert in many important developments in the communications, aviation, and missile fields, particularly in the area of standard connectors and cables. Dave's wife of 54 years, Anne, continues to reside at 1115 Tranquil Trail Dr., San Antonio, TX 78232-5185. He is also survived by a son, a daughter, two grandsons, and a granddaughter.—**Charles H. King, Jr.**, secretary, 7509 Sebago Rd., Bethesda, MD 20817-4839; e-mail: colspaceman@aol.com>

## 42 55th Reunion

**Lou Rosenblum** writes, "Professor of Earth Atmospheric and Planetary Sciences Mario Molina, Nobel laureate in chemistry, with his charming scholar wife, has accepted our invitation to speak at our 55th Reunion class dinner on Friday, June 6, 1997, at the MIT Faculty Club. . . . **Frank Seeley** sends a new address: 38 Freshwater Ln., Hilton Head, SC 29928; tel: (803) 341-7987. He would like to see any classmates on their way to and from southern sojourns. . . . **Carl Zeitz**, still in Fall River, Mass., turned 75 last April 1. He is still working every day and is still married to the same wife after 48 years. Son Barney is a stained glass artist with recent work in Washington, D.C., Martha's Vineyard, Providence, and Boston.

**Sam Card**, Class of '40 reunion committee, invites one and all to join their reunion at the Sundial Beach Resort in Sanibel, Fla., January 15-19, 1997. For more information or to register, get in touch with Sam at 1304 SE 22nd Terr., Cape Coral, FL 33990, or by phone at: (941) 772-8911. . . . **Bob Rines** married Joanne Hayes last June 2 at Bailey's Bay in Bermuda. They will be living at 65 East India Row, #24F, Boston. Congratulations and all best wishes to them! . . . Please note our new address; we're moving to another apartment in this condo group.—**Ken Rosett**, secretary, 215 Martling Ave., Tarrytown, NY 10591

## 43

Good news from prexy **Jim McDonough**. **George Freedman** has accepted the chairmanship of the 55th Reunion Committee. He is selecting committee members for the initial meeting this fall and hopes to have plans in place by late spring 1997. We can all be grateful for the persuasiveness of our Maxi-

mum Leader. Full speed ahead to '98!

Additional information has come regarding **Herbert Johnson**, whose passing last October was reported in earlier Class Notes. Herbert emigrated to Canada in 1963 and became a Canadian citizen. Over the next several years he served as president of EDO Canada, a designer and manufacturer of sonar systems. In 1969, he helped to found C-Tech Ltd., located in Cornwall, Ontario. At C-Tech Herbert helped to develop advanced military sonar systems and also to adapt defense sonar for fishing in Canada and other markets abroad. He retired as chairman of C-Tech in 1993, being succeeded by his wife, Lydia-Marion. She and three children survive him.

A committee co-chaired by Samuel Card, '40, and Frank Hulswit, '49, have formulated a Florida Gulf Coast MIT Mini-Reunion Program for January 1998 at the Sundial Beach and Tennis Resort, Sanibel Island, Fla. It is open to all alumni/ae, featuring, in addition to the mandatory recreational events, the educational themes of MIT in Florida and MIT, Science, and Technology in the 21st Century. Those interested may request additional information from Sam and Frank in Cape Coral, Fla., or from Janet Serman at the Alumni/ae Association office in Cambridge.

Another postcard from **Stan Proctor**, our peripatetic class agent, announces a summer pilgrimage to Rome for a board meeting at John Cabot University, followed by some vacation time at Lake Como and a visit to his "Europro" company in Luxembourg.

In June your secretary performed in a production of Gilbert & Sullivan's *HMS Pinafore*. This was my eleventh appearance in a show for the G&S Society of Tulsa, the first being another production of *Pinafore* in 1985. I now have achieved awesome seniority.

You classmates who have had careers comparable to Herbert Johnson's, send some news about them so that it can be printed while you're still alive. Don't leave it only for your obituary.—**Beb Rorschach**, secretary, 4727 S. Lewis Pl., Tulsa, OK 74105-5138

## 44

Tech Day this year, was Saturday, June 8. Our class was represented by **Ed Roos**, **Bob Clarke**, **Lou Demarkles**, **Melissa Teixeira**, and **Holton Harris** and wife Jeanne.

**Holton** would like to encourage more '44s to attend next year, not only for the camaraderie, but also to plan for the upcoming 55th Reunion in 1999. It's a good idea. We shall explore the possibilities and report soon.

At about one million, the Class of '44 Scholarship Fund is one of the larger alumni/ae class funds. During the 1995-96 period, 11 students received funding from our class. Five of the 11 received renewed funding. The five repeaters are **Kley Achterhof** (Iowa), **Marc Carlin** (Maryland), **Naresh Desiredi** (Texas), **Ann Torres** (Maryland), and **Alexander Zakharov** (New York). The six new recipients are **Damon Bramble** (Connecticut), **Jodi Krawczyk** (California), **Tara Schenkel** (Connecticut), **Andrea Shochet** (Florida), **Amy Varney** (Maine), and **Myong-Sin Yi** (Illinois). **Kley**, **Marc**, **Ann**, **Alexander**, and **Amy** are seniors. We have received several letters from the recipients expressing gratitude for the assistance our fund has provided. They

# ClassNotes

described the difficulties and the impossibility of attending MIT were it not for the fund.

There has been debate regarding ROTC at MIT. We refer you to the articles in the April 1996 and July 1996 issues of the *Review*, as well as the final report of the ROTC Task Force, dated March 20, 1996, and amended April 17, 1996. The April 1996 article invited comments from alumni/ae with ROTC experience. Our class president, **Ed Roos**, and both your secretaries have written individual letters to President Vest. Even at this late date, if you have not expressed your view, we encourage you to do so, since our class has more experience with ROTC and its importance to our nation.—Co-secretaries: **Louis R. Demarkles**, 77 Circuit Ave., Hyannis, MA 02601; **Frank K. Chin**, 221 St. Paul St., Brookline, MA 02146

## 45

A belated Happy 50th anniversary to **Betsy and Tom Hewson**. Daughter **Debbie** threw a surprise party during a Hewson family reunion in late June—and a special thank you to **Katie** and **Jake Freiburger** for advising us of this event.

The class was well represented at Pops and the Cardinal and Gray Pre-Pops dinner on Thursday, June 6. Attendees were: **Dee** and **Frank Gallagher**, **Ann** and **Bob Maglathlin**, **Jan** and **Charlie Patterson**, **Carol** and **Jim Pickel**, **Janice** and **Dave Flood**, **Evelyn** and **Bob Schmitt**, **Roxie** and **Emmett Day**, as well as **Bill Meade** and **Tom McNamara**.

**Art Miller** plus **Beverly** and **Homer Eckhardt** joined the group for dinner; **Jim Gurney** attended Technology Day activities.

Normally I would put together a pack of lies regarding this group, but your secretary was off sailing in Chesapeake Bay at the time.

We can report, however, that the **Gallaghers** had a great time in the UK in late May. After a week in London as typical tourists, **Dee** and **Frank** joined four fraternity brothers for a week of walking through the Cotswolds. **Dee** notes that **Frank** was not only the tour director and van driver, but advised local contractors on their construction habits, read the British pub-ites in song, etc.! The Cotswold interlude was followed by a train trip to Edinburgh and Oban, Scotland. The preceding is **Dee's** report as **Frank** was off fishing when I called.

**Jean Wristley** advises that husband, **Don L. Wristley**, died on August 29, 1995, at home in Lady Lake, Fla. . . . **Juan A. Vegas** of Caracas, Venezuela, died on August 4, 1992. We have not details on either classmate.

Let's hear from you.—**Clinton H. Springer**, secretary, P.O. Box 288, New Castle, NH 03854

## 46

For our 50th Reunion from June 6-12, we had a record attendance of 108 class members and 106 accompanying persons. **Bob Hoffman** did an excellent job as our chairman.



The next few editions of the *Review* will include an extended report of these reunion activities.

At the Technology Day luncheon, Ted Heuchling, our reunion gift chairman, announced a total gift to MIT from our class of \$4,306,915.72. The Class of 1946 includes 392 people, who graduated in February, June, or October 1946. Of these, 257 (or 65.6 percent) contributed to this class gift. The total gift substantially exceeded the targets we had set in 1994 and 1995.

John Maynard and Dan Cooper were given special recognition for the excellent work they did in assembling our 50th Reunion Yearbook. It was a thorough presentation. Extra copies are available. At Pops night, the graduation procession, and many other events, most class members wore their new cardinal red MIT blazers.

At our class business meeting, we elected class officers to serve for the next five years as follows: Bob Hoffman, president; George Ley, VP and 55th Reunion chairman; Ned Tebbetts, secretary; Herb Oedel, treasurer; and Ted Henning, class agent.

On June 8, seven class members were joined by two younger MIT graduates to row an eight-oared shell for one mile on the Charles River. The seven Class of 1946 members (mostly overweight) included: Ted Heuchling, Bob Hoffman, Ralph Huschke, Fran Kurris, Ed Potter, Bill Rapoport, and Ned Tebbetts. Many wives, children, and grandchildren were witnesses to the fact that we did not capsize the boat.

For the Newport clambake, the total attendance was 132 people, most of whom stayed at the Doubletree Hotel on Goat Island in Newport. At the Newport croquet tournament the winners were Ginny and Herb Oedel. Runners-up were Larry Body and Bob Blake. In Newport most of the class took a harbor tour of the "Yachting Capital of America." We visited the Hammersmith Farm Estate, the Rhode Island summer White House for President Kennedy.

I regret to report the deaths of three class members. Winthrop Edward Sullivan died on



Winthrop Sullivan

February 25, 1994. He had a master's degree from Course VI. He had been chief engineer of Hammond Industries in Madison, Ala. He is survived by his widow, Caroline Sullivan. . . . Louis Wilmot died in 1996. He had a degree from Course VI. . . . Anton F. Zagar died in 1994. He lived in Vancouver,

Wash., and is survived by his widow.—Edwin H. Tebbetts, secretary, 9 Jerusalem Rd. Dr., Cohasset, MA 02025

## 48

A mailing went out recently to classmates asking for class dues. In the first two weeks after the mailing, well over 100 classmates sent dues in support of our 50th Reunion.

By the end of the first month another 40 brought the total to 140 classmates.

Activities for our 50th Reunion will begin at the Samoset in Rockport, Maine, located on the city boundary with Rockland, Maine. The hotel is known for gracious dining and luxurious rooms in a beautiful setting adjacent to their 18 hole golf course on Penobscot Bay. Nearby, the Farnsworth Museum houses many original Andrew Wyeth and Winslow Homer paintings. A few miles away, the Owl's Head Transportation Museum has an extensive display of cars, planes, and more.

The campus portion of the reunion will follow and plans are well along for a post-reunion gathering in Bermuda. Reunion Committee members George Clifford, Graham Sterling, and Sonny Monosson will send mailings to keep classmates informed of reunion plans.

At Technology Day in June, professor Ann Mayes joined George Clifford, Harold Ottonbrini, Graham Sterling, Mike Oglo, Ann and Harry Jones, and yours truly for lunch. Ann is the current recipient of the Class of 1948 Career Development Professorship. She was appointed assistant professor of Polymer Physics in MIT's Department of Materials Science and Engineering in 1993. Ann told us about an undergraduate lab course she developed to teach students the entire array of sophisticated instruments used to analyze materials. The two previous recipients of the 1948 Professorship were recently promoted to full professor—Mehran Kardar and Jackie Hewitt are both in the Department of Physics.

Bill Zimmerman continues to enjoy the buying and selling of companies. Bill has reduced some business activities, but he operates Zimmerman Holdings, which owns a number of companies.

We have several deaths to report. Al Levenson died in January. He was a Navy veteran of WWII and he served in the Pacific as a communications officer. He owned and operated Hand Skills, Inc., in Haverhill, Mass., and the Mohawk Beading and Novelty in Portsmouth, N.H. He was a lifelong Haverhill resident. Recently he was employed as a buyer for a company in Portsmouth. Al attended several of the Champagne Brunches at Endicott House, including one in December 1994. . . . John Wolfe died in February. He retired from Itek as president of their optical systems division. He worked on many secret spy satellites and analyzed films of President Kennedy's assassination for the Warren Commission. While serving in the Army in WWII, he earned a Purple Heart and Bronze Star during the Battle of the Bulge. He and his wife, Joan, had been living in Billerica, Mass. . . . John Reid died in 1994. His sister informed us that he had been living in Schenectady, N.Y. . . . Bob McCarthy died in 1994. He had a consulting business in Westwood, Mass. He is survived by his wife who still lives in Westwood. . . . Richard Smith died in 1995. He wrote software for numerous military aircraft, and began his computer career programming in machine language on

the IBM 650. He and his wife, Catherine, lived in Sherman Oaks, Calif. On behalf of our classmates, I extend our sympathy to all these families.—Marty Billett, secretary, 16 Greenwood Ave., Barrington, RI 02806; tel: (401) 245-8963

## 49

Jack Fogarty's Christmas 1995 letter has lain handy by my elbow all these months, while he has ground his teeth to powder wondering what happened to his stuff. (I have

a wheelbarrow full of excuses, Jack. Write for samples.) Jack and Peggy flew south to the Galapagos Islands via Quito, the capital of Ecuador, in a tour organized by Elderhostel. They write of seeing hundreds of sea lions and pups, huge lava fields knee-deep in blue-footed boobies, and the famous giant tortoises. "We did enjoy swimming with the sea lions. Suddenly you see a furry face in front of your snorkeling mask and next thing you know it's diving between your legs." Jack's letter deserves to be reprinted complete, but you can reach him for more of his report at <jfogarty@mail.bcpl.lib.md.us>.

The mini-reunion in Puerto Rico was a magnificent experience. Marlene and Emilio Venegas and Betty and Bob Griggs, as the island hosts, provided every amenity for the tour members, who included: Pam and Mickey Ligor, Cel and Fred Fletcher, Dot and Jim Christopher, Louesa and Don Gillespie, and Jean and Harry Lambe. (Jean Lambe took copious notes on the six-day visit, and your secretary is deeply indebted to her.) In the environs of San Juan—Bob Griggs's territory—the group enjoyed a private dinner and trip to the casino at the Caribe Hilton, a tour of the giant radio telescope at the Arecibo Observatory (with a lecture by Willem Baan, '77), swimming at a spectacular waterfall in the El Yunque rain forest and at beautiful Luquillo Beach, and a visit the El Conquistador Resort. Down in Ponce on the Caribbean coast—where Emilio seems to have a connection to everyone and everything in town—they were given the keys to the city by the vice-mayor, lunched at the Yacht Club, and toured the Fine Arts Museum (original funding for which was provided by Luis A. Ferre, '24.) There was a trip to Coffin Island aboard Emilio's luxurious yacht, a trip to a 19th-century coffee plantation in the mountains, and a celebration of Jean and Harry Lambe's 45th wedding anniversary. The meals in the magnificent Venegas and Griggs residences were memorable throughout, and the last stop of the trip was a tour of a beautiful new shopping mall on which Emilio's construction company is one of the contractors.

A feature in the *Boston Globe* (5/21/96) declares that Alex d'Arbeloff has led his company, Teradyne, to the Globe 100's top award—Company of the Year. "d'Arbeloff stands atop a vibrant electronics firm that has made its mark as one of the world's leading makers of semiconductor test equipment," the *Globe* wrote. The award, in its eighth year, honors the best-performing publicly traded company in Massachusetts. With 1,600 employees in its Boston headquarters (and 5,200 worldwide), Teradyne is the third largest manufacturing employer in the city.

Dr. Clinton O. Chichester, a professor of

## 47

### 50th Reunion

Please send news for this column to: R.E. "Bob" McBride, secretary, 1511 E. Northcrest

Dr., Highlands Ranch, CO 80126



food and resource chemistry at the University of Rhode Island, died of cancer on November 12, 1995. I had limited information about his life in my last column, but his wife, Eileen, sent an obituary from the *Narranett* (R.I.) *Times*, which I excerpted: Dr. Chichester was an internationally renowned figure in the field of food science and nutrition, and his achievements included the discovery of new natural compounds related to Vitamin A as well as advances in food processing. He received numerous awards from government, medical, and scientific groups; was the author or co-author of more than 400 research papers in chemical engineering, food technology, and nutrition; and edited numerous books on food research, pesticides, toxicology, and microbial safety of fishery products. Dr. Chichester also was a avid sports car race driver. In 1957, following the death of a friend in a race track accident, he was the co-founder of the Snell Memorial Foundation, a nonprofit organization to promote the safety and well-being of users of vehicular transportation. He produced papers on head protection, safety in racing, and protective headgear and developed protective-headgear standards for motor racing, motorcycling, bicycling, and equestrian and athletic events.

Edward Henry Mueller, a research supervisor at the Colgate-Palmolive Co. in Jersey City, N.J., died on April 26, 1995. I regret the lack of any further information. On behalf of the class, I extend our sincere condolences to the Chichester and Mueller families.—Fletcher Eaton, secretary, 42 Perry Dr., Needham, MA, 02192; tel: (617) 449-1614

# 50

Two classmates were kind enough to send news with their checks to MIT. It helps me when you send news when you write your check (and Mal Green says keep those checks coming!). Hansjoerg Stern writes that there is never a dull moment teaching fluid power and servomechanisms at Purdue and doing "a bit of consulting." He is happy that his students and clients keep his mind from rusting. "Vacations take me to the Northeast and South and Europe on occasion. Looking forward to the 50th. Mary and the kids and grandchildren are fine." Hope all of you are looking forward to the 50th. . . . Tom Wilson, a Course IV graduate, writes, "I've been very active in the professional field and have been in demand as architect and consultant on projects in Southern California—currently Leach International in Buena Park. My wife, Rene, and I enjoy MIT Club and community events. Last year we were in San Francisco for the United Nations 50th anniversary celebrations." . . . In the July column I reported that Fred Messina had qualified for the Boston Marathon. Fred completed the course in respectable time. His personal best is 3:43, and he runs one a year. His usual distance is a 10K. I have heard from no other marathoners, so Fred has the class record.

During May the MIT Club of Boston arranged a plant tour of Ionics, Inc., employer of many Tech alums. Joining me and other members there was Karl Ahlstrand. Karl retired in 1991 and keeps busy pursuing his woodworking hobby and helping his grandchildren with projects here

in Massachusetts.

In June, as one of Andover's many sessions to celebrate its 350th anniversary, the town held a forum titled, "Andover at 400," a look 50 years in the future. The featured speaker was Ken Olsen. Most predictions for 50 years hence are mere guesses, but Ken had a good one, i.e., the world of 2046 will be run by our children and grandchildren. His suggestion was that we aid their education by developing in them a "passion for learning." Ken keeps busy with his new company, Advanced Modular Solutions, which received a complimentary review in the May 17th *Boston Globe*.

Ray Hawes wrote from Hamden, Conn. He retired in December 1985 from Emhart Corp., where he was responsible for environmental compliance. He did environmental consulting until 1992. His avocation of genealogy resulted in publication of *The Edward Hawes Heirs*, 532 pages and over 15,000 names. He enjoyed reading of Les Allison in my July column. Ray notes that he, Les, and Gordon (Bill) Evans attended the same church in Hamden in the '60s. Bill still practices law in the area.—Robert A. Snedeker, secretary; Seven Mashie Way, North Reading, MA 01864; tel: (508) 664-1738; e-mail: <103244.1541@compuserve.com>

# 51

We now have a new class president. At our reunion, it was announced that Fred Bumpus will be assuming the position so ably handled over the past five years by Harold Glenzel. The

## ClassNotes

remaining officer positions, including yours truly, will remain the same for an additional five-year term.

Our reunion event at the Black Point Inn in Maine gave me the opportunity to talk at length with many of our classmates, among them Al Cohen. Al remains very active as the chairman of the board and CEO of ESSCO, the successful company that he cofounded in 1961. Al is the recipient of numerous awards that include Exporter of the Year and U.S. Business Advocate of the Year. His 1957 paper, "A 150-Foot Metal Space Frame Radome," provided the design concept known today as the Haystack Radome that has over a thousand applications worldwide. His life of successes received a jolt three years ago when he learned that his daughter, Lynn, had breast cancer. Al undertook to discover possibilities beyond current medical practice, investigating the way malignant tumors grow and how that growth might be checked. His quest led him to the efforts of Dr. Wiley Souba, chief of surgical oncology at Mass General Hospital, whose work focuses on the nutritional transporters that feed tumors. The hope is to chemically block these transporters without harming normal cells and starve the malignant tumors out of existence. Al created the ESSCO-MGH Breast Cancer Fund to support and accelerate this work. If successful, this program will be life saving to tens of

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To request a registration packet, contact RLE 50th Anniversary:  
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Working part time until 1993 for the University of Wisconsin following his retirement in 1991, **Christian Bolta** and his wife, Joy, are now devoting their time to travel, gardening, and reading. Chris also does figure sculpture and is taking painting lessons. He has moved to a home closer to his daughter's family and their three grandchildren. He and his wife often visit Napa Valley to see their other three children.

Having retired from teaching physics, chemistry, and coaching crew, **Charles Compton** is into choral singing. This avocation has taken him over the past year to the Coventry Cathedral, and Norway and Sweden. He plans to go anywhere that the singing will bring him.

Claiming that he hasn't sat in on a meeting since his retirement from GE in 1988, **Walter E. (Mike) Johnson** is sharing his time between Louisville, Ky., and Naples, Fla. He plays tennis and golf and spends time with his grandchildren. . . . Looking back fondly at 14 years of memories, **Robert L. MacCallum, Jr.**, closed MacCallum Associates in 1995. This company specialized in the marketing of ferro alloys and metals to the foundry and steel industries. He has moved from Connecticut to Brunswick, Maine.

Sensing some skepticism about the claim in our 40th Reunion class survey of having nearly 100 domestic and foreign patents, **Joe Iannicelli** provided me with a five-page listing of those patents. The most widespread of these was the process and equipment for magnetic separation of feebly magnetic contaminants from kaolin. This doubled the reserves of a \$1 billion-per-year industry in Georgia. Joe also provided me with four pages listing his publications and presentations. He included some pictures of the beautiful mansion on Jekyll Island that he designed and acted as general contractor for construction. He has probably the world's largest collection of rifles fashioned with exotic woods from around the globe. His other hobbies include various vehicles; he has a car collection of vintage Eldorados and an ultralight Paraplane. Currently, he is restoring an 80-ft. Navy ocean-going tug-boat.

After 41 years at the MIT Lincoln Laboratory, **Walter I. Wells** has retired as assistant to the director. He is enjoying his retirement by traveling and visiting his family and four grandchildren.

We sadly received word of the passing of **Thomas Francis Dell** on November 11, 1994. He had been working at High Tech Intelligence, Inc., in Denver, Colo. We extend our condolences to his wife. . . . We also received the sad news of the sudden passing of **Robert S. Hudders** on May 13, 1996. He had been employed at the Linde Division of Union Carbide Corp. and at UOP for 42 years until his retirement in July 1993. We extend our sincerest sympathies to his wife, Shirley, and their two sons.—**Martin N. Greenfield**, secretary, 25 Darrell Dr., Randolph, MA 02368; e-mail: <greenfld@tiac.net>

# 52

## 45th Reunion

Please send news for this column to: **Richard F. Lacey**, secretary, 2340 Cowper St., Palo Alto, CA 94301; e-mail:

<mit1952@mitvma.mit.edu>

# 53

**G. Harold Tseklenis** reports that he took early retirement in March of '95 from Fluor Corp. where he reached the position of VP, project director, of Fluor Daniel. Harold's

career at Fluor spanned 41 years, which he found to be both gratifying and exciting. This career took Harold on extended assignments all over the world, to the Caribbean, Sweden, Holland, Germany, Brazil, Venezuela, the U.K., Japan, and Iran. He and Anna are now having fun in community activities and personal pursuits. Harold writes, "With so many books to read, places to visit, people to see, and creative hobbies to pursue, I hope my stamina holds up for me to get around to all the things I want to see and do." Harold and Anna live in Downey, California. This is your column. Please write to me and tell me what is happening in your life. Use the mail, phone, fax or e-mail.—**Joseph M. Cahn**, secretary, 20 Ocean Park Blvd., Unit #9, Santa Monica, CA, 90405; tel: (310) 396-6322; fax: (310) 553-0687; e-mail: <jmc20@aol.com>

# 54

**Howard Brody** has sent an end-of-semester letter from UPenn, where he keeps busy in the Department of Physics when he is not out on the tennis courts trying to improve

everybody's game. He notes that his book, *Tennis Science for Tennis Players*, is advertised in every issue of *Technology Review*, but with no indication that he is an alumnus as well as the author. And the ad is for Technology Review Books! But he keeps on plugging. During the summer, he was the keynote speaker at a conference on the engineering of sport at the University of Sheffield in England. Last month, he spoke on how physics can improve your serve at the Professional Tennis Registry International Symposium in Hilton Head. And now he is back teaching physics.

Let us hear about your latest activities. Your classmates are really interested.—**Edwin G. Eigel, Jr.**, secretary, 33 Pepperbush Ln., Fairfield, CT 06430

# 55

No fresh news from classmates this month, and we've been asked to help conserve paper and costs for *Technology Review* by not republishing excerpts from our 40th

Reunion Yearbook (if interested in seeing some of those fascinating life stories of our classmates, you can still get copies of that book from our treasurer, **Paul Attridge**), so this column will indeed be brief. We were asked, however, to mention a "Florida Gulf Coast MIT Mini-Reunion Program" that is being planned for January 15-19, 1998, at



Sanibel Island, Fla. The idea is to accommodate, simultaneously, mini-reunions mixed with some academic seminars for multiple classes of alumni/ae who either live in, expect to be, or want to be in that part of Florida in mid January (1998). If interested, please contact one of your co-secretaries or write directly to **Samuel Card**, 1304 SE 22nd Terr., Cape Coral, FL 33990-4628.

Otherwise, please send news to co-secretaries: **Roy M. Salzman**, P.O. Box 197, Rockport, ME 04856-1097; **James H. Eacker**, 3619 Folly Quarter Rd., Ellicott City, MD 21042

# 56

Our 40th Reunion was very well attended with 127 classmates registered. There were 164 attendees at the pre-Pops buffet and 226 at the Friday evening gala at the Museum

of Science. The fun continued up at the Black Point Inn Resort in Maine with a dinner dance,



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clambake, sports, sight-seeing, etc. At the clambake there were 147, all enjoying the excellent food. From the very active tennis participation emerged some outstanding competition at a very high level of play from **Tom Hoffman**, **Merlin Lickhalter**, **Phil Schaffer**, **Craig Sherbrooke**, **Dan Wolfson**, and **Sheila Wolfson**.

The new class officers are as follows: **Ted Korelitz**, president; **Arnold Schindler**, treasurer; **William Grinker**, co-chair, 45th Reunion; **William Leitch**, co-chair, 45th Reunion; **John Stelling**, co-chair 45th Reunion; **Walter Frey**, class agent; **Ralph Kohl**, co-secretary; **William Northfield**, co-secretary.

Please send news for this column to: **Ralph A. Kohl**, co-secretary, 54 Bound Brook Rd., Newton, MA 02161; e-mail: <kohl@ll.mit.edu>

# 57

## 40th Reunion

Please send news for this column to: **John Christian**, secretary, 23 Fredana Rd., Waban, MA 02168; tel: (617) 969-2741

# 58

**Greg Lazarchik** has decided to take early retirement after 39 years with PPG, most recently spent in mergers and acquisitions and new product development. Now he and Ann are considering building a log home in the mountains of western Pennsylvania where he can be "close to fishing and away from neighbors and

city." He intends to resume his violin playing and woodworking, both of which were largely given up during his working years. This, plus a little consulting that might come his way, sound mighty inviting!

Additional information has been received about **Lew French** whose death was reported in the July '96 Class Notes. He is survived by his wife, **Frances**, one son and two daughters, six grandchildren, and an aunt. **Lew** was active in the choir, bus ministry, and children's Sunday school at his church. He was a member of the **Houston Geological Society**, a precinct chairman in the **Brazoria County Republican Party**, and was known as an avid fruit tree and nut tree horticulturist. We extend the sympathies of his classmates to his family.

Another endorsement for retirement has arrived from **Chris Hahn** who sends word from Colorado that he and his wife have been retired for five years and are enjoying it very much.

Ahoy mates! June 8 was the occasion of the '58 Mini-Reunion, consisting of a scenic three-hour dinner cruise on the **Charles**. A congenial group of 32 classmates and spouses enjoyed potables, freshly grilled dinner with all the fixin's, and most of all, nonstop conversation on our own private vessel as we cruised up and down the river and into **Boston Harbor** before returing to shore. In attendance were **Veronica** and **Ed Vinarub**, **Claire** and **Burt Figler**, **Nancy** and **Ed Krokosky**, **Chesley** and **Bob Logcher**, **Jean** and **David Crockett**, **Bobbi** and **Fred Fisher**, **Maywood** and **Lou Giordano**, newlyweds **Howard Salwen** and **Sheryl Marshall**, **Ceres** and **Joel Shulman**, **Beth** and **Al Russell**, **Glenn Strehle**, **Martha** and **Bob Rose**, **Karen** and **Bob Schmidt** (who would have won the prize for coming the farthest distance, if there had been a prize), **Marty O'Donnell**, **Pat** and **Larry Boedeker**, **Nancy** and **Mike Brose**, and **Bebe** and **Gary Fallick**. It was great fun, departing before the glow of evening and returing after dark with the lights of **Boston** and **Cambridge** sparkling all around us.

Hats off to **Ken Auer**! He is the first '58er to submit information for this column to me by e-mail. He reports from **Montgomery, Ohio**, that he retired on **March 1** after 18 years at **Quantum**, the last of five large corporations he worked for during his career. He notes that he and **Greg Lazarchik** started together in the same department at **PPG**, but while **Greg** remained, **Ken** moved on to **Diamond Shamrock**, **Brockway Plastics**, and **Borden**, prior to **Quantum**. While at **PPG** **Ken** obtained an **MBA** at **U of Akron** and with which he went on to positions in sales, marketing, and business management.

Although he and **Linda** have enjoyed living in the **Cincinnati** area for the last nine years, they have opted for small-town living and will be building a new home on land they have acquired in **Greenville, Tenn.**, in the foothills of the **Smokies**. **Ken** says it will be like living in **Vermont**, only 30 degrees warmer! They have five children, with four living in **New Hampshire** and **Maine**, and two grandchildren. They are looking forward to attending our 40th Reunion.

Please send your news.—**Gary Fallick**, secretary, 4 Diehl Rd., Lexington, MA 02173; e-mail: <fallick\_gary@waters.com>

# ClassNotes

# 59

Please send news for this column to: **Dave Paker**, secretary, 31 The Great Rd., Bedford, MA 01730; tel: (617) 275-4056(h), (617) 441-7766 (w); e-mail: <70421.1766@compuserve.com>.

# 60

A recent press release from **Storage USA, Inc.**, reports that **Morris Kriger** has joined the firm as executive VP of acquisitions. **Morris**, who has his **JD** from **Harvard**, has special-

ized in real estate and lending law and has represented developers and lenders throughout the U.S. . . . **Peter Siverberg** writes that he is now associate editor of *Chemical Engineering*, a division of **McGraw-Hill**. **Pete** worked for 30 years as an engineer, the last 17 as an electrical engineer in nuclear plant construction. Although a product of **Course X**, **Pete** said that the one semester of 6.18 was the most important course he took. Based on that one experience, he decided that electrical engineering was not for him, and as luck would have it, "that's what I ended up doing." In 1992, when the nuclear construction business "ran dry," **Pete** said that his "attempt at public service was to teach chemistry at **Atlantic City High School**. There was a **BIG** mismatch. I have state certificates for science and math, but I won't try to teach again." **Pete** writes that he passed a writing test, landed a job with the magazine and published his first editorial in May. For all you **Course Xers** looking for a friendly editor, **Pete** says that he is looking for articles to publish. . . . Finally, I received a letter from **Samuel Card**, '40, chairman of the multi-class mini reunion program for the **Florida Gulf Coast**. If you're interested in attending, the first event is scheduled for **January 1998**, contact **Card** at 1304 SE 32d Terr., Cape Coral, FL 33990-4628; tel: (941) 772-8911. Hope to hear from some of you soon.—**Frank A. Tapparo**, secretary and class agent, 15 S. Montague St., Arlington, VA 22204; e-mail: <ftapparo@lmi.org> or <ftapparo@aol.com>

# 61

Our 35th Reunion was a remarkable success. Remarkable to me because I assumed no one would show up for a minor reunion. About 100 members of the class arrived, many with

spouses. We had a good time seeing old friends and meeting classmates we never knew. We started off with **Tech Night** at the **Pops** nearly filling **Symphony Hall** with **Tech** tools. From the balcony it was a remarkable sight with a large contingent at their 50th Reunion resplendent in their bright red jackets. The **Pops** played "Arise Ye Sons of MIT" in its politically correct version and we all sang the unfamiliar words lustily. After the **Pops**, two separate receptions were held in some adjacent function rooms—one for older alumnae, the other for younger. For the first time we were consigned



to the elder of the two. The next day we got into three WWII amphibious DUCKS and toured around Boston and the Charles River. The driver taught us to talk like southern ducks: "Quack, Quack, Y'all," a skill we used on unsuspecting tourists. We were let off at a waterfront Boston restaurant and, after a fish lunch, heard a wonderful talk from Dave Latham (who works at Harvard's Smithsonian Astrophysical Observatory) on newly discovered planets rotating around distant suns. The talk was notable for its use of a weather balloon, vacuum cleaner, and assorted fruits and vegetables. With these props Dave explained that Jupiter was actually located at Logan Airport. After various MIT tours we then gathered in Pritchett Lounge for a '50s style dance complete with music from our childhoods. Several women wore crinolines and poodle skirts for the occasion. **Ben Zaren** wore a dirty tee shirt with an unopened pack of cigarettes rolled up in its sleeve. Next day there were gatherings of various living groups and a general meeting to reelect the current posse of class officers and to drink heavily. Then we all went home to await the reunion in 2001!

**Joe Harrington** reported on the Fiji gathering. "The '61 Fiji contingent wound up the reunion weekend with a 3-hour cruise up the Charles River. The Charles Riverboat Company picked up the group at the Sailing Pavilion with *Charles II*, which turned out to be a fully-stocked bar completely surrounded by a small boat. The highlight was running aground (temporarily) in Watertown, but it was such a soft landing (or such a good party) that some of the group only found out much later. Along for the ride were Alice and **John Vlcek**, Liz and **Ed Strachan**, **Tom Hastings**, **Marcia** and **Al Gaston**, **Pat** and **Bill Dryden**, and **DiDi** and **Joe Harrington**. Plans were made to sign up **Pete Burleson**, **Sandy Wagner**, and **Dave Ness** well in advance of 2001 to assure 100 percent attendance at our 40th."

Every now and then I interview classmates to gather material for future columns. In the meantime I'll use recent mail. **Mike Wiederhold**, who was at the reunion, writes that he is continuing his work as director of research in the Department of Otolaryngology—Head and Neck Surgery at UTHS-SA (I think that's the University of Texas Health Center San Antonio), as a full professor. He says his life has been exciting with a Space Shuttle experiment in 1994 and three more scheduled for 1997 and 1998. It involves a lot of travel but has been a chance to work with "superb colleagues from Japan, Germany, Holland and across the U.S."

**Ira Dorf** writes, "My wife, Shelly, and I live in Saratoga, Calif., where she teaches elementary school. For the last six years I've been VP-HR for Inform Software of Menlo Park, a company reported by *The Wall Street Journal* as the No. 1 publicly held company in the U.S. in terms of return to stockholders for the period 1991-95. Our son, Michael, practices corporate law in San Francisco. Our daughter, Lisa, is a management consultant, also in San Francisco. Our youngest son, Larry, just graduated from the University of Arizona this spring."

Finally this sad note from **Bill Hecht**: "I am saddened to report the passing of **John P. 'Pat' Shea**. Pat was with us at the 35th. We wound up the Saturday evening with a small group of us former Burton Denizens together in the old House chowing down on Chinese food and swapping old stories. Pat was full of life that night. He apparently died early Mon-

day morning, June 10, at his home in Stratford Conn. He is survived by his mother, Mrs. John P. Shea.—**Andrew Braun**, secretary, 464 Heath St., Chestnut Hill, MA 02167; e-mail: <andrewb820@aol.com>

## 62 35th Reunion

Famous bachelor classmate **David H. Koch** was married on May 25, 1996, at his home in Southampton, N.Y., to **Julia M. Flesher**. The wedding ceremony was performed by The Very Rev. James Parks Morton, Dean of the Cathedral of St. John the Divine in New York. According to the May 26, 1996, announcement in *The New York Times*, David and his new bride met on a blind date.

**Gordon R. Knight** sent a note via the MIT Alumni/ae Office and then sent an e-mail to follow up. He has started a new company called TeraStor Corp. in San Jose, Calif., with **Jim McCoy**. Jim was founder of Maxtor and cofounder of Quantum Corp. They are developing a new, super-high-density removable disk drive using several new technologies. TeraStor is a small venture capital company, but Gordon says he is having a lot of fun and making rapid progress. You may recall reading about the new breakthrough in high-density removable hard-drive technology in this column, courtesy of the inventor, **Gordon R. Knight**. . . . **Peter Canepa** dropped us an e-mail with the news about **Gordon Knight**, his Sigma Phi Epsilon fraternity brother, and added that he is also starting a new company—as cofounder and CTO of Infinity Multimedia International, a Los Angeles company developing and commercializing a new autostereoscopic (no glasses) 3D display technology. Peter's company was financed initially by the cofounders, then recently obtained financing from an outside investor and investment banker. Next an IPO or private placement. Both Peter and Gordon are excited and challenged by the risk and potential of going it alone after many years of toiling in large corporations. Both are wine aficionados who recently met with another classmate and fraternity brother, **Bob Kurkjian**, in the Napa Valley for a long weekend of wine-tasting. Bob still works for the Hughes Corporation.

Follow-up to last month's message from **John Stanley**. John hit the big 5-0 this year—not 50 years old, but 50 countries as a broadcast engineering consultant working with Christian radio stations. After 3 years in India as a teacher, and 13 years at HCJB in Quito, Ecuador, as chief of operations and director, John and his wife, Ruth, began installing, maintaining, and training engineers for high-power broadcast equipment. Apparently he prefers vacuum tubes to transistors. John says, "If you can't get inside it, it ain't a real radio transmitter." He and his family are presently living on Lookout Mountain, south of Chattanooga, Tenn., in a home that he and Ruth built between trips to far-away places.

**Marcia** and **Jeremy Goldberg** are proud parents. Their son, **Eliot**, finished his master's degree in International Affairs (with a specialty in Middle Eastern Studies) at George Washington University. Their daughter, **Devra**, is entering the MIT Sloan School in August in a "technical MBA" program. Jeremy is still

modernizing DDG 993 class ships for the Navy, but he and his ships are under a new Navy organization: Program Executive Officer for Surface Combatants—AEGIS Program. **Marcia** is doing Judaic and Public Affairs programming at the District of Columbia Jewish Community Center.

**Richard S. Orr** writes that after 11 years as technical director at Stanford Telecomm in Reston, Va., he joined Atlantic Aerospace Electronics Corporation, in Greenbelt, Md., eight years ago, where he is director, Communications Systems. The company is run by **Bob Cooper**, who may have graded some of our undergraduate exams. His current interests are in the application of time-frequency and time-scale methods in signal processing and communications systems. Rich is married to the former **Julie VanTilbury**, and they have four daughters (only one is still at home, age 8), two cats, and one dog. One of their girls is in grad school at that red brick school up the river from the Tute (Harvard). Don't feel bad Rich, my wife and I just celebrated her 35th reunion up there and my stepdaughter graduated up there in 1990. Rich is staying active with music, playing trombone, composing, and arranging in his spare time, has 2 CDs as performer and arranger, with plans for more. He is contemplating a book on wavelets in communications if he can find the time, is in good health, and stays active in the works of his church as well. . . . **George W. Meyer** sends news that he has decided to leave Georgia Baptist Medical Center in Atlanta and will be heading out to the Sacramento area to be near his children and granddaughter. He expects to stay in Atlanta until the Olympics and then do some traveling. He promises to let us know where he and his wife land. They expect to permanently relocate after December 1996. . . . **Brian Strong** and his wife, **Nancy**, finally have their three children through college (BC, Duke, and Connecticut College), and are now off cruising in their Doug Peterson 44 Cutter, *Louise*. When not sailing, Brian is trading equity options and striving to keep his racquetball and poker competitive. They will be in Maine for the summer and wanted to invite any of the e-mail gang that might sight *Louise* to hail them and come aboard to catch up on the news. If you're tuned in on the WWW, check our Web site at: <<http://web.mit.edu/alum/www/Class/mit1962>> or e-mail: <[mit1962@mitvma.mit.edu](mailto:mit1962@mitvma.mit.edu)>. Please send your news to: **Hank McCarl**, secretary, P.O. Box 352, Birmingham, AL 35201-0352; e-mail: <[hmcaryl@mail.business.uab.edu](mailto:hmcaryl@mail.business.uab.edu)>

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Please send news for this column to: **Shoel M. Cohen**, secretary, Dept. of Psychology, Nassau Community College, Garden City, NY 11530; e-mail: <[71271.2627@compuserve.com](mailto:71271.2627@compuserve.com)>

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**Laurence R. Hootnick** (Course XV), senior VP of finance and operations for Power Computing Corp., was named to the board of Consilium, the leading supplier of integrated manufacturing execution systems software and services. From 1994 to 1995 Laurence was



executive VP and COO of NetManage, and from 1991 to 1994 he was president and CEO of Maxtor Corp. Laurence received an MBA in finance from the University of Maryland.

Leo F. Cardillo recently concluded 31 years with the CIA and a subsequent brief contract with the House of Appropriations, Surveys, and Investigations staff. Current plans are to begin a new career with Computer Sciences Corp. Son Frank graduated from the University of Virginia and youngest daughter Eileen has just completed her first year at William and Mary. Wife Bobbee is continuing a very successful career in real estate with Coldwell Banker/Stevens. Leo runs a soccer program for the senior boys teams in the greater Fairfax, Va., area. . . . **Russ Norris** and Dixie were in Boston for the baptism of their new granddaughter. Russ is now dean of students at Wesley College in Dover, Del.

Joe Kasper, our previous class secretary, got involved with the Northern New England Cardiovascular Disease Study Group, a group of researchers and practitioners from the five medical centers that perform open-heart surgery in this region. The group had studied the mortality rate associated with the coronary artery bypass graft (CABG) procedure among the 19 surgeons performing the procedure. They had come up with a number of mortality predictors based on age, gender, body size, health state, etc. The "un-understandable" residuals became their focus at the time Joe got involved with the group. His role as an engineer was to observe at the systems level while asking "dumb" questions.

Surgeons, anesthesiologists, perfusionists, and nurses in the five medical centers began to share information about the best ways to do things. Three years after the "quality intervention" began, enough data was in hand to draw meaningful conclusions. The net result was that the mortality rate across the five centers had dropped by 24 percent. Specifically, over three years, there were 74 people still alive who otherwise would have been predicted to have died as a result of the CABG operation. These results were published this spring in the *Journal of the American Medical Association*, and was picked up by the *Boston Globe* and the *Washington Post*. The *Globe* piece described Joe as a "rocket scientist," referring, he believes, to his Course XVI graduate work.

The study group is continuing its efforts including the same type of analyses to other procedures such as valve replacements. Joe continues to be involved as a consultant. Based on the experience, Joe believes that there are a number of opportunities to apply the structured thinking, taught to us at MIT, in fields that are very different from traditional "science and engineering."—**Bill Ribich**, secretary, 18 Revere St., Lexington, MA 02173; tel: (617) 862-3617; e-mail: <mit1964@mitvma>

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**Bruce Fauman** is now devoting most of his time to his consulting group, Abbey & Fauman. He still is living in Vancouver, British Columbia.

. . . **Neil Lupton** and his wife, Claire, continue to spend weekends riding llamas, bushwhacking, and enjoying other outdoor sports. Neil continues to be active in the Boy Scouts, having just finished as head of the

Explorer program here in Boston. He recently got a mention in *Tech Talk* as a co-author of a patent with a young MIT Professor, Steven Leeb, on a magnetically triggered gel system for chemo-mechanical action. . . . **Yazan Sharif** reports that he has moved to Basking Ridge, N.J., where he has been appointed president of the Engineered Pumps Group at Ingersoll-Dresser. . . . **Bill Grosky** is now chair of the Computer Science Department at Wayne State University in Detroit.

Dick Freedman is running for State Representative in the Twelfth Middlesex District (West Newton). "After many years of putting up with the liberal climate of Massachusetts, I've decided it's time to fight it." Dick welcomes those interested to e-mail him at <mf@ctcne.com> or sign onto his Web page at <http://www.wp.com/mf>.

From the June 19, 1996, *Palo Alto Weekly*, comes the news that **William A. "Bill" Ryland**, died June 1. He was a longtime Palo Alto and Portola Valley resident who most recently lived in Atherton and Pebble Beach. A native of San Francisco, he attended Menlo-Atherton High School. He worked at Hewlett Packard for 17 years, and was a cofounder of Avanti Software in Palo Alto. He is survived by his mother, Nancy Ryland; a sister, Sally Plaisted; a brother, David Ryland; and two daughters, Lisa Ryland and Jill Ryland. — **George McKinney**, secretary, 33 Old Orchard Rd., Chestnut Hill, MA 02167; tel: (617) 232-4710; e-mail: <georgemck@aol.com>

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**Gerald B. Lichtenberger** writes, "After 20 years of venturing, air travel, and helping to shepherd four IPO's in the medical device/systems area, I have settled down to occa-

sional consulting and business development activities, amidst tennis, bicycling, and recreational travel (gotta use up those frequent flyer miles). Hope to do 2,000 miles or so on the bike this summer, looking toward a transcontinental run sometime before the 'big' millennial 55th birthday. Wife, Susan, (ex-roommate of Betsy Dyro, wife of Joe Dyro, '63, and fellow Delt) is heavy into volunteer activities, and kids. Brandy (senior at UNC), Jason (junior at U of Penn), and Stefan (junior in high school) are in high gear, while Dad is now totally laid back. Any '66ers want to visit scenic western NJ and take in a bike tour, or a tennis game? Please call or e-mail to <lichtenb@haven.ios.com>."

After spending over 20 years at Bellcore and Bell Labs, **Paul Liao** will be moving to a "non-Bell" company. His new job will be as CTO for the Matsushita Electric Corp. of America and the president of Panasonic Technologies, Inc., which is a collection of research laboratories located around the United States. . . . **Mel Goldman** sends along a "catch-up" letter. He spent three years in the Peace Corps in Nepal, followed by work as math advisor to US AID. He then built a consulting/training company which is now 25 years old. He got a master's at Princeton's Woodrow Wilson School and spent the rest of his career in international development. For the past ten years he has worked for the World Bank throughout Asia, mostly in India and Korea, stimulating technology development in industry and finding venture capital. Previously, he headed the

## Up the Infinite Corridor MIT and the Technical Imagination

by Fred Hapgood

This lively, eminently readable account of MIT's engineering research will stir up memories while bringing readers inside some of the current projects happening around the Infinite Corridor. Delving into MIT's rich, sometimes bizarre history, *Up the Infinite Corridor* explores the folkways of undergraduate life, as well as the

unique sense of humor that emerges from the pressures and insecurities of the place where everyone's intellectual accelerator is wired to the floor.



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bank's office in Columbia. At the reunion Mel noted he is developing one of his own interests—a vineyard in the Finger Lakes region of New York. He and his wife, Dorothy, have three children, one a physics major at MIT.

Following the acquisition of Fairchild Space and Defense Corp. by Orbital Sciences Corp. in 1994, **Joseph Bravman** became senior VP of the newly formed Advanced Systems Group. He is responsible for many projects, including the design, production, and launch of the 34-satellite Orbcomm communications constellation. . . . **William Marlow** missed the June reunion because he was invited to be part of the physical chemistry delegation visit to China, a citizen ambassador program of People-to-People International.

At the reunion, 61 class members (accompanied by 42 guests) registered for at least one alumni/ae event. It was a quieter reunion, befitting our age perhaps, with more time for visiting among classmates and touring both on and off campus. Our class gift was double the average 30-year gift. We'll have the final figures soon. I have agreed to serve as secretary for another term so keep those e-mail messages coming.—**Eleanore Klepser**, secretary, 84 Northledge Dr., Snyder NY 14226-4056; e-mail: <vismit66@uvbms.cc.buffalo.edu>

## 67 30th Reunion

**Stan Rose** has been with Bankers Trust in New York City for almost 19 years—

quite an accomplishment these days! During the last eight years Stan has been in the group that sets corporate technology policy and, as a result, has had the opportunity to visit most of Bankers Trust's international locations. Stan is the United States coordinator for their Sydney, Australia, technology unit, and he enjoys the visits there, although the 25-hour trips have not gotten any easier. Stan has succeeded in having Bankers Trust join the MIT VI-A co-op program, the first financial services institution to do so, and its managers have been very happy with the competency of the MIT students. Stan's daughter Stephanie graduated from Wellesley last year, and son Jeffrey, who is a senior in archaeology at the University of Richmond, spent last year studying in Israel. Last summer the Roses spent a few days visiting Elaine and **Jeff Weisen**, and they followed that with a safari vacation in Africa.

**Claus Emmer** lives in Prior Lake, Minn., and works for Minnesota Valley Engineers, which builds about 70 percent of the cryogenic tanks used in the United States. He's "happily into developing systems to further destroy the non-value added parts of the gas distribution value chain. This particular thrust is known as Project ORCA." Claus has gone back to school to get "the calcium out of the pipes." He's taking courses to get a master's of technology, patterned after the one from MIT, and in fact two of the faculty in that MOT program are from MIT. It's a challenge to hit the books for 20 hours a week with the over-achievers and still work the normal 50 to 60 hours per week on the job. Laura, his wife of more than 26 years, is very supportive, and they talk on Saturdays between 2 and 4, or so it seems. They've built their final home in

Minnesota, complete with a small lake, 10 acres, and lots of little critters that flutter, crawl, hop, and bound. Their first born, Caroline, has graduated from University of Wisconsin in Eau Claire with a degree in communications. Their last born, Claus, is busy figuring out the meaning of life and would have fit perfectly into the Cambridge of the '60s.

Jane and **Ron Gomes Casseres** live in Curaçao, Netherlands Antilles, where Ron is managing director of Maduro & Curriel's Bank NV, the only one in its 79-year history who is not also a representative of a major shareholder. Ron and Jane took their daughter Lisa to Princeton last fall, and their oldest son Marc is happily married and working as a mechanical engineer with Lockheed Saunders in New Hampshire, after getting an MS from Worcester Polytechnic Institute. Their second son Glenn graduated from Princeton as a physicist in 1995 and is now working as a research analyst in Alexandria, Va., for Coopers & Lybrand before attending NYU Law School. . . . **Eric Johnson** has been a VP of Development at Carnegie Mellon. He crosses paths with many of the same folks that he interacted with when he was on the staff at MIT. Carnegie Mellon has an outstanding college of fine arts, including a drama department, so Eric gets to hobnob occasionally with people like Holly Hunter and Jack Klugman, both alumni/ae. Eric and Kathy have been married 28 years, and Kathy continues to work on issues concerning women and minorities at Carnegie Mellon. Their children are grown and out of the nest. Mari (24) is working in Washington, D.C., but attracted to California, and Marcus (21) recently graduated from the University of Vermont.

Last year **John Fittz** was named manager of supply management at ABB CE Nuclear Systems in Windsor, Conn. They're working hard to capture a major share of the nuclear plant market in China and other Asian countries. By the time this appears in print, John will have finished a two-year master of science in management program at the Hartford Graduate Center (associated with Rensselaer Polytechnic Institute) concentrating on management of technology. Joannie has been working on an MBA at the same institution, leaning toward marketing, and she also works for the Connecticut Economic Resource Center. Their son Jonathan has completed his junior year at UConn, majoring in human development and family resources. Daughter Kristie is majoring in English writing and minoring in psychology. When John turned 50 he fulfilled a decades old ambition by running the Greater Hartford Marathon last October. He finished in 3:59:21 and thus beat his goal of under four hours. John and his new dog run 3 to 5 miles each morning. . . . **Carl Elison** lives in Baltimore and has been working for the last couple of years as a cryptographer for CyberCash, a rapidly growing company that offers secure money transfers over the Internet. Since graduation Carl has been a full-time computer scientist designing software, hardware, and systems.

Finally, another reminder on our upcoming 30th Reunion next June—we need your help, and you can get on board by contacting **John Rudy** at (508) 440-3768 or <jprudy@swl.msd.ray.com>. By the way, at last report, John and Jan were planning to visit China for three weeks this summer, and their daughter Hilary was planning to be in

Hong Kong in June for a one-month internship.—**Charlotte and Jim Swanson**, co-secretaries, 878 Hoffman Terr., Los Altos, CA 94024; e-mail: <jswanson@lat.com>

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As we write this in early June we have just returned from a two-and-a-half-week trip to Japan that was a combination of lectures and vacation. Having struggled to learn Japanese

at the "advanced survival level," we traveled to obscure parts of the countryside staying with friends in towns where few westerners are seen. The host of one seminar assumed we would give it in Japanese, but we begged off as we are not ready for that level, now if ever. We did meet Tanya Sienko, '82, at one of our seminars on regulatory policy in the United States. She is very fluent in Japanese and works for their science and technology agency. We also had a chance to meet with Ken Ohmae, G '70, whom we have known since graduate school days. Ken is a nationally known political activist in Japan, in addition to being a highly regarded consultant to industry.

In the few days since we returned from our travels, two classmates have been featured in national publications. The June 17 issue of *Time* had a cover story on America's 25 most influential people. There, between Nobel laureate Toni Morrison and household guru Martha Stewart is our own **Mike Hammer**. *Time* quotes him as saying that his lifework is "undoing the Industrial Revolution" through "re-engineering." Stay tuned for his new book, *Beyond Reengineering*. . . . On the front cover of *IEEE Spectrum* is the smiling face of **Bob Metcalfe** holding a giant slide rule (no explanation given) with the Charles River and MIT in the background. The cover story is in honor of the award of the 1996 IEEE Medal of Honor to Bob for inventing, standardizing, and commercializing Ethernet, the most widely used system for linking up computers in local area networks. Our congratulations to both Mike and Bob for these honors.

We hear from **Dennis Sager** that his oldest daughter, Lauren, graduated Phi Beta Kappa from Princeton. Next daughter, Deborah, is now a sophomore at University of Pennsylvania. She was one of three finalists in the 1995 "Jeopardy!" Teen Tournament. (Lauren was on "Jeopardy!" in 1991). Two more kids, Michael and Jill, are at home.

That's all we have for this month. Keep those cards and e-mails coming. We are particularly interested in compiling known e-mail addresses so that we can communicate more frequently within the class. One goal is to send advance e-mail copies of our column to our e-mail mailing list. Therefore, please send us your electronic addresses.—**Gail** (ghm@nrc.gov) and **Mike** (mmarcus@fcc.gov) **Marcus**, secretaries, 8026 Cypress Grove Ln., Cabin John, MD 20818

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Let me start these October notes with a letter from **Lewis Flagg**, which I'm reasonably certain was lost electronically. It's a bit old (my apologies, Lew): "After grad school in

Chicago and living in California, Illinois, and Ohio, I am back home in New England. My



wife, Susan, and I have two children. Susan works at Bose. Our son, Byron, is in the dreaded senior year of high school where he decides which \$28,000/year college to attend. MIT is on his list, as are Cornell and RPI. Our daughter, Christine, is a sophomore, but already showing the mathematical aptitude that will put MIT on her list as well. I wonder if I can get a group rate. In my late 40s, I took the scary leap into having my own business. As principal of The Milford Group, I sell and consult in support of accounting and job-costing software for professional service firms like architects, engineers, and consultants. Naturally there are a number of fellow alumni among my clients, but I am always happy to have more. I am from Maine originally, but that is not the only reason I am glad to be back home in New England. I love to ski and sail and I like the four seasons, and this is the place to live for those things. You can see why I haven't written in 25 years: no real news. But then I didn't mention touring with a gospel music group throughout Latin America, but that is another story."

A fantastic update and invitation from classmate **Bruce Donath**, who really knows the good life: "There are many who have dreamed of chucking it all and heading out to do something really different; and that is what my wife, Debby, and I have done this past year. Just in time to face the wrath of two hurricanes in the summer of 1995, we purchased a small resort and its well-known beach bar, the Soggy Dollar, in the British Virgin Islands. With no experience in the hospitality or entertainment business, we sold nearly everything State-side to buy the place. Debby has been running the place for 10 months (a formidable experience for her!), and just this year I finally resigned my position at Cadre Technologies to make the transition complete. Frankly, focusing on the number of cold beers in the aging propane refrigerator (nothing to do with cold fusion, Gene!) is a lot more interesting to us these days than facing decisions based on the likely acceptance of object-oriented technologies. This is no retirement, as some may think. Workdays in a small operation can be long, and the 'island ways' of getting things done Byzantine. Nevertheless, our little place, named Sandcastle on Jost Van Dyke (pop. 150), is on a gorgeous beach. Our overnight guests and sailing day visitors offer a kaleidoscope of backgrounds and interests that keep us enthused. And our new neighbors are also proving to be welcoming. The daily discoveries and challenges brought to us by our dependence on water travel and the needs of a small business have reignited us. We have had to develop a new perspective toward minor crises and problems that at its root accepts that we are usually on the edge of impending chaos. Anything that is not chaotic is a blessing. Fortunately, few of the problems have serious consequences. Might as well put in a plug! Call our service at (809) 775-5262 on St. Thomas for a brochure, or call us on site (cellular phones only, as yet!) at (809) 690-1611. We'd love to have everyone visit!"

We have moved again (July 1996) to yet another house in Bow, closer to Concord and the Infinite Energy site. Mail letters from now on to: **Eugene Mallove**, secretary, One Ridgewood Dr., Bow, NH 03304; e-mail: <76570.2270@compuserve.com>

# Bob Metcalfe Wins IEEE's

## Top Honor

**T**he Institute of Electrical and Electronics Engineers (IEEE) awarded its Medal of Honor for 1996 to Robert Metcalfe, '68, citing his invention of the Ethernet, promotion of Ethernet standards, and commercialization of Ethernet-compatible products. The award, which was presented at IEEE's annual meeting in Montreal in June, also made Metcalfe the subject of a cover photo and long profile in the June issue of IEEE's magazine, *Spectrum*.

Ethernet is the leading local area network (LAN) technology, providing a high-speed path for data to flow between computers within an organization or site. Generally agreed-upon estimates are that 50 million machines are connected through 5 million Ethernet networks worldwide.

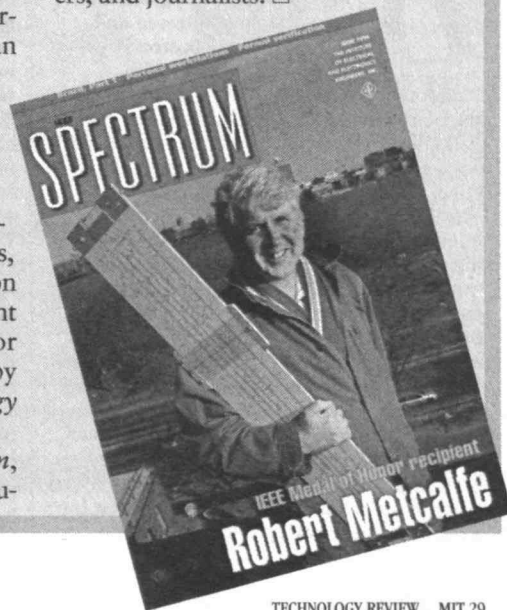
Metcalfe invented Ethernet, on which he shares four patents, in 1973, while working at the Xerox Palo Alto Research Center in California. In 1979, he left Xerox and founded 3Com Corp., and when he left 10 years later, it had become a \$400 million company with 2,000 employees.

Metcalfe, who holds a master's degree in applied math and a doctorate in computer science from Harvard as well as bachelor's degrees in management and electrical engineering from MIT, has long been an active MIT alumnus. At present, he is a member of the Executive Committee of the MIT Corporation and president-elect of the Alumni/ae Association, and he endowed the professorship in writing now held by Rosalind Williams, dean for undergraduate education and student affairs. His commitment to writing and public outreach for technologists is also exemplified by his membership on the *Technology Review* Board.

In the interview for *Spectrum*, Metcalfe credits MIT's Undergradu-

ate Systems Program (USP) for much of his success and for his commitment to writing. USP was a highly selective (only 12 students), intense, and free-wheeling experimental program created in the '60s by then-professor of engineering Jay Forrester, SM '45, who is now professor emeritus and lecturer in the Sloan School.

Since leaving 3Com in 1990, Metcalfe has been something of an industry gadfly and intellectual pollinator. His official title is vice-president, technology, for the International Data Group, a Boston-based empire of 270 publications founded and headed by Patrick McGovern, '59. Metcalfe served for two and a half years as publisher of and is now executive correspondent for *Info World*, one of the IDG publications. He is a frequent speaker at conferences and will chair the 50th anniversary conference of the Association of Computing Machinery next March in San Jose. And *Spectrum* reports that Metcalfe likes to use his townhouse office-residence, directly across the Charles River from MIT, to host "salons"—informal gatherings of technologists, business leaders, and journalists. □





Paul Manoogian spent a year in Hong Kong performing technical monitoring of some of the contracts for Hong Kong's new \$20 billion, one-runway airport. He is now in

Denver, where he is still with Hughes Aircraft Co. after 25 years. . . . **Sandy Harlow** last year moved to Nielsen Marketing Research where he is currently the Analytics Director on the Kraft/Miller team analyzing data on new products, promotions, and pricing from 3,000 stores and 40,000 households weekly. With one boy each on piano, clarinet, and trumpet, Sandy's life at home is full of music, as well as soccer and homework. . . . **Julie Norton** has been promoted to chair of the Department of Statistics at California State University in Hayward. She e-mailed, "Who would have thought that guiding six academics could be so MUCH work!" . . . **Bob Sameth** is doing risk management and option pricing at Greenwich Capital Markets, Inc. He has lived in Croton-on-Hudson for the last four years with his wife and two sons, aged 6 and 11.

**Tom Halket** has recently formed the law firm of Halket & Pitegoff LLP in Larchmont, N.Y., focusing on the corporate and commercial representation of computer, "Silicon Alley," new media, high technology and other companies. His eldest son is in 12th grade and applying to colleges. Tom writes, "Thirty years after we all went through it (although it really seems like yesterday), nothing seems to have changed except the tension—I am not sure whether it is worse for the parents or the kids." . . . One of **Howie Bluestein's** tornado photographs was on the cover of *Time* magazine at the time the movie *Twister* was released. . . . **Jim Brasunas** claims to be working on a book entitled, *The Vanishing Art of Doing Nothing*. We are pleased to announce that our 25th Reunion received a Presidential Citation from the Alumni/ae Association at the Alumni/ae Leadership Conference in September. We believe the award was primarily for the Sha Na Na beer blast arranged by **Joe Bisaccio**.—**Karen and Greg Arenson**, secretaries, 125 W. 76th St., 2A, New York, NY 10023; e-mail: <dghbm13d@prodigy.com>

Parties, reminiscing, renewing old friendships and making new ones, more fun, laughter, lectures, lab tours, Boston and Cambridge, the Boston Pops—it was all there at our 25th

Reunion. Class of '71 came in third overall in the Tech challenge games. We won the haiku/limerick contest. I had planned on coming since our 15th Reunion and knew I was going to have a good time. I had more fun than I ever anticipated. I am honored and humbled to have graduated with so many highly intelligent people. About 100 class members attended one or more functions—our most successful reunion ever. Let's try for more on our 30th. For those of you who missed it, you missed a lot. I urge you to come next time because your classmates are a great group of people.

Many thanks to **Jim Shields** and the rest of the reunion committee for their hard work, to **Bob Schulte** for his success in a hoped for class gift of \$1.5 million, and to **Zane Swanson** for compiling our reactions to changes in our

lives. Special thanks to everyone who made contributions and/or pledges to the class gift.

I collected business cards from many of those in attendance, but I know I missed a lot of people. It is amazing the number of our classmates who make their living in the software or computer hardware business.

We elected new officers: **Bob Schulte**, president; **Del Knarr**, VP; **Dale Schain Krouse**, treasurer; **R. Hal Moorman**, secretary; and **Zane Swanson**, class agent. Del Knarr established a new record for the fastest and most undemocratic election possible. If anyone needs a supplemental bio, contact Del at <del.knarr@trw.com>.

**Zane Swanson** gave a number of hallmarks of a nerd including: (a) your idea of good interpersonal communications is getting the decimal point in the right place and (b) your spouse has no idea what you do for a living. Many of us fulfill the role of the absent-minded professor. At least one of our classmates (who shall remain nameless) managed to get the schedule entirely confused. He said he should have brought his wife to tell him where to go and what to do. Some of our classmates celebrated their 25th wedding anniversaries along with the reunion. **Doug Ell** and I were the only two class members who still owned and had the nerve to wear some living group T-shirts. Doug wore his Burton bomber jersey and I wore an old Delt jersey. It amazed both of us now much cotton shrinks in 25 years.

For our 30th: What to do with the money in the Kent State Lecture Series Fund. We have about \$30,000. Maybe some of our investment gurus in the class can invest this for a great return for the 30th and we can add it to the class gift. E-mail your comments to me.

On to news of classmates. . . . **Timothy J. Maloney** has been promoted to principal engineer after 12 years at Intel. He designs and tests electrostatic discharge protection circuits for all of Intel's components. He says it's a marriage of electronics and physics, with opportunities to publish, patent, travel, run conferences, and teach short courses while constantly using things first learned at MIT. . . . **Lloyd Marks** is chief of Pediatric Cardiology at the Childrens Hospital of New Jersey. He writes: "Although I'm a busy clinician specializing in interventional pediatric cardiology, my prime identification is as an MIT engineer. I have had the opportunity to develop a number of medical devices and have received 12 patents. This year has seen seven successful licenses. I am blessed with two wonderful, wild boys, Matt and Mike, and a great wife, Janice, who is an environmental attorney."

**Mehdie Jazayeri** continues as professor of computer science at the Technical University of Vienna. His son has been accepted to the MIT class of 2000. . . . **Thomas M. Gearing** writes: "My computer consulting business, Prodigal Software, is doing well. Some traveling has been required to serve clients: American Express in Manhattan, Bell South and Georgia Power in Atlanta. New hobby is SCCA racing, driving a Datsun 200SX in class ITB." . . . **Joe Martin**, VP for health statistics for the American Hospital Association, is now working on new statistical services for public policy, advocacy, and management education in community health and health system integration.

Your class secretary has come out of the dark ages. My e-mail address is:

<moorman@phoenix.net>. Please e-mail me your news and, as soon as I learn how to find it, I will publish it in Class Notes. Otherwise, you may correspond by the normal means: **R. Hal Moorman**, P.O. Box 1808, Brenham, TX 77834-1808; fax: (409) 830-0913

## 25th Reunion

Once again we are short on notes this month, but **Paul Raeburn** has moved to *Business Week*, after 15 years at Associated Press.

He is the senior editor for science and technology, including medicine and the environment.

I was just in Cambridge briefly in June. I saw **Bonny Kellermann**, and she said that planning was going great for our 25th Reunion, which will be held next June 5-8. I hope to see a lot of the class there since it will be our 25th Reunion (already!). If you have not yet, please start planning to be there, since it is only eight months away.

Please send your news to me or Dick. I look forward to hearing from you.—**Wendy Elaine Erb**, secretary, 6001 Pelican Bay Blvd., #1001, Naples, FL 33963

This month's news is exactly one letter, from **David Mark**, who writes that his job at Clintec Nutrition Co., a joint venture of Baxter and Nestle, may disappear when it is split

between the parent companies later this year. David would like to hear (at <markd@baxter.com>) how other people have dealt with this type of fuzzy future (and whether anyone has job leads for a person with a background in nutrition research and product development).

That's all for now. I'm just back from Camp Smith, Hawaii, on business, set to tackle the pile that generally accumulates at such times. Write or e-mail!—**Robert M.O. Sutton, Sr.**, secretary, "Chapel Hill," 7721 Churchill Ct., Marshall, VA 22015, note new zip code!; e-mail: <sutton\_bob@prc.com>

Fellow ATO **Bill Peak** sold his Baton Rouge independent insurance agency in 1993, after eight years of practice. The next year he returned to the field of chemical engineering

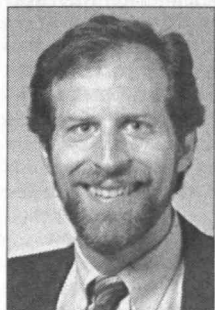
by joining Mechanical Equipment Co. (MEDCO) of New Orleans. He enjoys his work as a project engineer handling seawater distillation plants for Saudi Arabia and Hawaii. Also, he became a grandfather on St. Patrick's Day 1995 and now has two reasons to celebrate the date (as if one isn't enough). His youngest son graduated from high school this year.

From our overseas correspondents, **John Plum** reports his family relocated to Tokyo in June 1994, for the second time. Two daughters attend the American School, and the eldest will graduate next year. John manages the local investment management company for Citicorp. He says, "This is a great time to be in Japan!" . . . **Tessa LeBinger** lives in New Rochelle, N.Y., with husband Marty and daughters Tzipora (15) and Batya (11). She



opened her own office last year in White Plains to practice pediatric endocrinology. Her only difficulty in life is the phone lines in her office that only work intermittently, and she seeks advice from phone experts in the class since the phone company is of no help.

**Roger Goldstein** was elected VP/president-elect of the Boston Society of Architects in



**Roger Goldstein**

February. Roger is as associate with Goody, Clancy & Associates in Boston and gained fame as the project manager for the recently completed Biology Building at MIT. Roger lives with his wife, Cindy, and sons Todd and Jordan in Brookline where he is active as a member of the town's ADA transition team. . . .

**Ronald Hollander** in January was named president and CEO of the Massachusetts Hospital Association, after serving as acting president for five months. Ron has been with MHA for 15 years in a variety of senior management positions. Ron lives in Newton with his wife, Toby, and their four children. . . . **William Young** reports he is still playing tennis whenever he can, which he claims isn't enough. C'mon, that Arizona address implies the opportunity is there! He still enjoys the game and is playing it well. He's looking for matches with northern classmates who happen to be

in Arizona on business or pleasure.

From here in the vacation spa of Two Rivers, **Bob Gahl** reports one of his twin boys was accepted for a science camp this summer. Both boys already have applications ready for the 'Tute, though they have several years to go. Bob and your secretary, both members of the local hospital board of directors, can relate to the challenges facing Ron Hollander and other classmates involved in healthcare.

This month's secretary, **Dave Withee**, is eagerly awaiting his annual summer vacation in the lake country of Minnesota. Daughter Anna has taken to swimming like a fish. The backyard has become the neighborhood playground now that dad has erected a swing set. Hope all is well with you and yours. Keep that information coming; there really are classmates who want to hear about you and love to hear there are others with similar experience.—Co-secretaries: **David Withee**, 3702 Adams St., Two Rivers, WI 54241-1404; tel: (414) 794-1331; **Barry Nelson**, 65 Hillside Ave., West Newton, MA 02165-2543; e-mail: <barryn@world.std.com>

# 75

Greetings everyone! Some of the news this time goes back a ways due to some paper shuffling between **Peter Dinhofer** and me. Here goes: **David Katz** dropped a line to say, "Life goes in snowy Philly suburbs. Rob's bar mitzvah in May 1995 was our major event. Karen has found a job teaching high school social studies. We've both been certified as soc-

# ClassNotes

cer coaches; it's not as easy as it looks!" . . .

**Glen Speckert's** CD on the art of canine frisbee is progressing well. A preview of the content is available on the Web, from Glen's home page: <<http://www.shore.net/speckert>> . . . **Sonia Melendez** writes, "I have a 19-year-old son who wants to transfer to MIT after considering that it was not that bad after all for me. Would love to hear from **Barbara Attenburg**."

**Joseph A. Martore** is president of MSI, a management consulting firm providing solutions to government and industry in their management of complex technologies. . . .

**William S. Dynan** writes in a note he penned on New Year's Day 1996: "I left the University of Colorado after 10 years to found a new program in molecular biology at the medical college of Georgia in Augusta. My wife, Rhea Markowitz, and children Maple (6) and Benjamin (3) are looking forward to being in our new home on the Savannah River." . . . **David Carino** writes in from Australia to say, "Frank Russell Company has transferred me to its office in Sydney, Australia. I've been with the company at its headquarters in Tacoma, Washington, for eight years now, where I've led a team of operations researchers and econometricians. I'm looking forward to the new opportunity. My wife, Gail Fitz Carino, and I would welcome any visitors down under." His address is: Frank Russell Compa-

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Congratulations to **James W. Simon** and his wife, Cindy Baker, who had a baby, Daniel, in December 1994. . . . **Allen C. Hart** reports, "In August of 1995, after 20 years working for big companies, I decided to try my hand at my own business. I have a systems engineering and software development business called TechSolvers. Another big milestone is coming this June, when my daughter, Erin, will graduate from high school." . . . **Barry Weinstein** dropped a line to say hello. He is (as of June 1996) half-way through a six-month assignment in Bratislava, Slovakia. He says it was exciting exploring Prague, Budapest and Vienna, but that Bratislava is a little boring.

That's all for now. Thanks to everyone who provided news. Keep communicating!—**Jennifer Gordon**, secretary, c/o Pennie & Edmonds, 1155 Avenue of the Americas, New York, NY 10036; e-mail: <gordonj@pennie.com>

# 76

First, I would like to thank you for re-electing me to another term as class secretary. I will continue to try to do a good job. Thanks to the creation of our listserv and the

growing ability of our classmates to send/receive e-mail, I am looking forward to hearing from more people more frequently. I hope that before the end of my term we will have a multimedia version of the Class Notes, complete with video and sound clips. In the interim, I wish to exhort you to continue to try to find classmates with e-mail addresses, and encourage them to join our listserv. We are, over time, building an electronic Class of '76 community, and wish to include everyone.

From U.S. mail, **Andrew Chestnut** writes, "I've been settled in Pelham, N.Y., longer (going on five years) than anywhere else since graduation. Heather and I have been married since 1981, and have a boy (Zachary, 10) and girl (Christina, 12). I'm enjoying life in the fragrance and cosmetics industry as VP of finance and CFO of Sandofi Beaute, Inc., the company that markets Oscar de la Renta, Yves St. Laurent, and Nina Ricci products." . . . **Neil Kaden** is "having an exciting time launching new client/server product offerings to traditional Nortel customers. Also having fun with a small company that I serve on the board of, which is trying to grow two orders of magnitude in two years!" . . . **Michael Neff** and his wife, Maureen, will be celebrating their 15th anniversary this year. They have three children, Adam (12), Erin (10), and Brittany (5). Mike is still with SEAL Laboratories in El Segundo, Calif., and invites classmates to call him. (Because of the large number of unsolicited calls we tend to receive, our policy is not to publish phone numbers in the Notes column. They can be obtained by sending an e-mail or fax, or making a voice call, to either the Alumni/ae Association or to the class secretary.)

Via e-mail, we also have news. Your secretary is indebted to **Gail Rubin Walker** for the following reunion news: "Our 20th Reunion was wonderful. Classmates attended with assorted spouses, children, and friends. Everyone who came had a great time and we wondered how we can get the rest of you out there to show up for the next one (the 25th!). There's something very satisfying about spend-

ing time with a group of people who have been through a similar experience in their lives and who are now at a similar stage of life. I thought the best event at this reunion was the Tech Games. **Harry Lee Gearhart** led our team and we tied for first place with the class of '86, which had twice as many classmates attending the reunion as we did. I know what you're thinking—"games for adults, how cute." Many of us felt that way at first, but it really was a lot of fun, even if you chose to just watch. We won the Hexagonal Close Packing (seeing how many people we could fit within a circle of rope; 20 feet, I believe)—we had 54 people in 3 layers. We won the mini-2.70 design contest because our device to propel a whiffle ball moved the ball the furthest. And we won or tied (there was some dispute) the alumni/ae bowl (like a college bowl with questions taken from MIT trivia and freshmen courses). Thanks to **Tom Martin** and all the people who put this reunion together."

**Bob Heuman** lives in San Francisco. He married Liz Swanson in 1990 and they are expecting their first child in October. Bob writes, "During the eighties I was with a software startup in Silicon Valley. For the last five years I have been managing software development for Iris Financial Engineering and Systems, Inc., a small company that specializes in developing custom trading software. With clients split equally between Tokyo and Wall Street, I travel quite a bit. But I still enjoy skiing, hiking, and wine collecting, a hobby I started when I moved to California in 1979. It's a great match for Liz, who was formerly a professional chef." . . . **Burt Rubenstein** left CTP at the beginning of January and is starting a new Internet consulting services company, backed with venture capital from Greylock Management.

It is with great sorrow that I must report the death of another classmate, **Andrea Barton**. I await further details from the Alumni/ae Association. Our condolences go out to her family and friends.

Your secretary remains busy attempting to scratch out a living through a number of different activities. It is not easy, nor it is getting easier, to have one's own business(es). For those of you who are contemplating this step, my advice is to think about it very carefully. There is a certain relief, I imagine, in having someone else write your paycheck, and as for a paid vacation, I have forgotten what that means. Please do correspond. We always need news.—**Arthur J. Carp**, secretary, Quantalitics, Inc., 220 Henley Rd., Woodmere, NY 11598-2523; tel: (516) 295-3632; fax: (516) 295-3230; e-mail: <quantalyc@aol.com>

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## 20th Reunion

Please send news for this column to: **Ninamarie Maragioglio**, secretary, 9727 Stipp St., Burke, VA 22105

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Please send news for this column to: **Jim Bidigare**, secretary, 9095 North Street Rd. NW, Newark, OH 43055-9538; tel: (614) 745-2676; fax: (614) 745-5648

# 79

**Lisa Egbuonu-Davis** has been at Pfizer in New York City as director of Outcomes Research for the U.S. Pharmaceuticals Group since October 1994. She was recently hon-

ored by the YMCA of Harlem as part of their "Salute to Black Achievers in Industry." . . . I'm sorry to say that this is all I have to write this month. Isn't anyone out there doing anything??? Hope to excite a little enthusiasm and have more for you next time.—**Sharon Lowenheim**, secretary, 98-30 67th Ave., Apt. 6E, Forest Hills, NY 11374

# 80

**Edward Chang** moved to the Portland, Ore., area in June after "suffering nearly four years in the Northeast." He will continue to work with New Jersey-based Internet

Corp. on a trial basis from his apartment but is looking into teaching quantitative analysis at the community college level. You can e-mail Edward at <echang@juno.com>.

For those of you who contribute to the Class of 1980 Scholarship Fund I have received the following information. **Esther Kim**, a senior in chemistry, and **Erik Seidel**, a junior in mechanical engineering, received renewed funding. Esther devotes a lot of time to her UROP project studying synthesis of three-coordinate organometallic compounds. She is active in the Asian Baptist Student Association and plans to attend graduate school for a PhD in chemistry. Erik is active in his fraternity and enjoys playing football. He is a project coordinator for Project Contact, a program through which current MIT students contact prospective freshmen. During the school year he works part-time in the Alumni/ae Association and interns at an engineering company in the summer. Thanks to all of you whose generous contributions help support these fine students.

That's all the news this month. Send your news to me.—**Kim Zaugg**, secretary, 549 Fairfield Rd., Canton, MI 48188; tel: (313) 981-1785; e-mail: <vayda@erim.org>

# 81

*There and Back Again . . .* Our 15th Reunion is now a happy memory. Many thanks to the Reunion Committee, headed by **John Noone**, for their hard work in putting together a very enjoy-

able four days. Some of the attendees at our class meeting are in the photo at right. At the class meeting we elected officers for the 1996-2001 term. **Marc Chelemer** will be returning as our class president. Our VPs are **Irene Dale** and **Rob Schoenberger**. **Eric Sklar** will be handling the cash as our treasurer. And yours truly is happy to be continuing as your secretary.

*Class Factoids . . .* Among the highlights of the reunion was the presentation of the results of the class survey by **Lew Bender**. Some of the highlights: Of those who responded (about 19 percent), 82 percent were male, with 27 percent of the respondents from the New England area, 24 percent from the West, and the rest scattered over the rest of the world. About 22 percent of us have spent at least six months outside of the USA. Most of us are married (83 percent of the men and 79 percent of the women).



Survey respondents enjoyed studying at MIT so much that 74 percent went on to get at least one other degree. In fact, there were 169 post-graduate degrees earned by 131 people. Topping the list were 41 percent with an additional MS or MA degree, followed by 18 percent with an MBA, 16 percent with a PhD, and 10 percent with an MD (and even a few JDs). The studious nature of our class was further in evidence in that 75 percent of the respondents corrected at least one survey typo.

Family was the top priority with 69 percent of the class, with career chosen as No. 2 by 44 percent. The class enjoys a multitude of activities outside of work, including hiking, tennis, skiing, swimming, jogging, Rollerblading, weight lifting, golf, biking, and having sex (always a few smart-alecks). There seem to be more than a few couch potatoes as well: we watch an average of 6.8 hours of TV (actual survey results were bi-modal—either you watch no TV or a lot of it), and 95 percent own a VCR. Of course, most of us (90 percent) own a personal computer. But 8 percent own a boat, and 6 percent own a ski or beach house. However, no one who responded owns a plane.

At some point, Lew promises that all the raw data from the survey will be on the Internet at our class Web site and/or at the MIT Web site. In the meantime, if you're anxious to see the full report (including cultural interests, career information, salaries, and job satisfaction of the class), a self-addressed, stamped envelope (plus news about yourself for the class column!) to your secretary at the address below will get you a copy!

Oh yes, our class Web site! Rob Schoenberger will be setting up the site and coordinating entries. We'll need your input to bring the site to life, though. Possible submissions: your pictures, stories, ideas for the next reunion, photos from the 1977 freshman picture book (yes, we do want to know what we looked like back then!). Use your imaginations. You can reach Rob on the Net at <rob@subtechnique.com>.

A final action item from the class meeting: the 10-282 Renovation Fund needs your help! We're less than 40 percent of the way to our goal of \$50K. Maybe you didn't know this, but you can earmark all, or part, of your contributions to the Institute for the Fund. So if you've been giving to a particular program over the years, or to unrestricted funds, please think about redirecting some of that donation to the Fund. This is a one-time project for our class, so after it's completed you can revert to your previous donation patterns. And it's important: room renovation, and facility maintenance in general, is one of the hardest things to get financing for, but it's also something that has a direct and visible impact on the daily life of the students. And lastly, those of you who make a \$500 (or more) overall

contribution will have your names enshrined for all time on a handsome plaque to be placed prominently on display in 10-282. So come on!

Now for this month's class updates:

**Special Delivery . . . Tom Chang's** medical school education finally paid off last April when wife Joan and he had their second daughter, Erica, because Tom did the delivery himself in the passenger seat of their Honda Accord! As Tom tells it, "We were in the parking lot outside the birthing center waiting for the midwife to arrive. Erica beat the midwife by about five minutes. Joan said it was much more comfortable in the car than on a bed. She highly recommends the Honda Birthing Suite." Seems Erica's 3-year-old sister, Miranda, is happy to have Erica around and wants to hold her all the time. When Tom isn't practicing obstetrics, he's still practicing radiology at the University of Pittsburgh. "With all the health care cutbacks, everyone is being asked to work harder and harder all the time," but Tom's still happy with what he's doing.

**I Taught the Law . . . Good to hear from Rob Firester**, who writes from Marietta, Ga., down Atlanta way, that he's now a professor of law at the John Marshall Law School. Rob's "specialty" is contracts, although he also teaches criminal law and constitutional law. Prior to professorship, Rob attended Wayne State University School of Medicine in Detroit and Hofstra University School of Law on "Lon Gisland," besides working as an actuary (passing three exams before med school). Rob's been married for five years as of last June, had his first child (a daughter) in March 1995, and is anticipating for the second time around New Year's Day.

**Allied Doctors . . . Jon Peltier** "never expected to live in Jersey," but he's been there at Allied Signal's corporate research labs in

# ClassNotes

Morristown since finally getting his doctorate in metallurgy in 1987. Says Jon, "It turns out to be quite nice, more like New England than the toxic waste site I'd incorrectly envisioned." Jon started with Allied as a mechanical metallurgist, then got into "some really neat powder metallurgy aluminum processing stuff," until the cold war ended and customers lost interest (and funding!). Now he's doing metallurgy and failure analysis in his spare time, while serving as technology liaison to Allied's aerospace businesses, particularly for the turbine engine division.

We learn that Cynthia Zannetos Peltier also has her doctorate, a PhD in nutritional biochemistry from Tufts. She is currently working as "Dr. Mom," having placed the diploma in a drawer until the kiddies get a bit older. Says Jon, "She is thinking that she eventually will end up in education (if not therapy)." Speaking of the kiddies, Jon and Cynthia have three wonderful daughters. Christina (8 going on 16) is starting third grade, and is into reading, math, science, softball, and Rollerblades. Nicole (6) is going into kindergarten and is trying to prove that she can do anything big sister does, only better. Seems she's a budding artist, too. Mariana (3) "is basically into any trouble she can find. I guess when you're number three, you really try harder."

Jon goes on to tell us about the three weeks in the summer of 1995 they spent on the wonderful island of Cyprus, visiting the family of Cynthia's father, having a relaxing time in the sun and sea, and benefiting from the relatives' hospitality. This summer, also, they had to "make do" with a couple of weeks on Cape



**CLASS OF '81 REUNION GATHERING** ~ Front row, from left: Jim Mandry (with son), Mark Hellinger, Cynthia Zannetos Peltier, John Peltier, and Dave Powsner. Back row: Cullen Johnson, Mrs. Mandry (with baby), Jeff Gerecht, Max Klein (with Anne Baklander), Marc Chelemer, John Noone, Rob Schoenberger, Chris Wheeler, and Eric Sklar. Also attending but not shown: Lew Bender, Diane Lebowitz, Walt Crosby, and Brian Yokum.



Cod. Jon has yet to make it to the Jersey shore, so maybe that'll be next summer's fun. Jon notes that he recently heard from **Jim Schutz**, a fellow materials science major. Seems Jim got a PhD in 1991 and is doing a little consulting in Boulder, Colo. He's been working in composites, cryogenics, and testing and characterization.

*Back to the Bay* . . . After four years of consulting in Europe, **David Silverman** returned to San Francisco in 1995, and now works for IntelliCorp in Mountain View. Once back in the States, David met his wife, Angela, who hails from Romania. David and Angela were awaiting a blessed event as of last May.

*Quick Notes* . . . **Armand Tatevossian** informs us that he is a senior derivatives trader at Santander Investment, based in New York and Madrid . . . From Austin, Tex., **Edward Valdez** writes that he's marketing manager for Motorola, and has a new son, Lincoln Gates, born last January.

Keep sending 'em in. More photos next time.—**Mike Gerardi**, secretary, 412 N. Oakhurst Dr., #202, Beverly Hills, CA 90210; tel: (310) 203-8080 (w); e-mail: <mmg@jmbm.com>

## 82 15th Reunion

**Lisa Lam** is a project leader at General Scanning, Inc., leading a team to design a medical recorder. She works part-time, lives in Maynard, Mass., and has two children 4 and 7. Her biggest goal these days is balancing work

and family and making sure she spends enough time with her kids. . . . **John Loeber** currently lives in Brussels and works for Coopers & Lybrand International at their European Union Office. He advises on European affairs and institutions and coordinates multicountry projects. He and his wife and son enjoy living in Belgium—it's close to lots of interesting European places. There's also beautiful landscape to tour around. He can be reached at <101331.1252@compuserve.com>.

After Westinghouse MTD lost its Navy contract, **Michael Post** landed a job at AEG Automation Systems Corporation where he is the lead controls engineer on a \$13 million assembly line design project and loving every minute of it. . . . **Daniel Judd** founded Arlington Laboratory in 1993 which provides consulting to the semiconductor manufacturing equipment industry. He focuses on instrumentation hardware, software and systems. . . . **Mihir Ravel** just joined Tektronix's measurement division as director of Information Technologies after five years in Tektronix Labs. His new programs in communications and video technologies leave a little less time for mountaineering, but family hiking/biking still goes on.—**Helen (Fray) Fanucci**, secretary, 502 Valley Forge Way, Campbell, CA 95008; e-mail: <fangroup@aol.com>

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**Robert Cox** has volunteered to help set up a Class of 1983 Web site. He just finished a certificate program in computer science at the Harvard extension school and will be

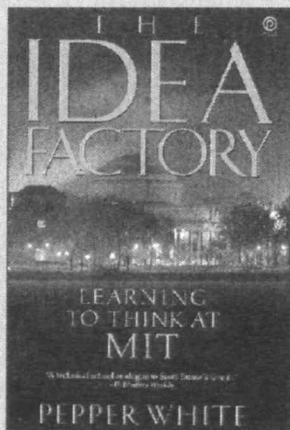
beginning a full-time master's degree program in computer science at Tufts University this fall. If you have any ideas for the Web site, please e-mail Robert at <rcox@usa1.com>.

**Dave Weinstein** and **Adrian Yovanovich** are working together on a project in Mexico for Mercer. . . . **Dawna Levenson** is a partner with Andersen Consulting in Tampa, Fla. . . . **Athena Edmonds** is busy with three daughters, moving into a new house, and looking for investments for a private venture fund. . . . **Jeff Muss** is close to finishing a PhD thesis in rocket science at Berkeley. . . . **David Cooke** is now an assistant professor at Johns Hopkins University School of Medicine in pediatric endocrinology.

**Stephen Janowski** and **Eileen Seligson Janowski** announce the birth of a baby girl on April 13, 1996. Unfortunately, in their excitement, they forgot to write down their new daughter's name. But in typical MIT style, statistics are available; six pounds, nine ounces, eighteen inches. . . . **Mike Santullo** reports that his Internet white pages directory company, Four11 Corp. (<http://www.Four11.com>) is hiring good people as fast as they can be found. Mike encourages all alumni to enter a listing with their MIT affiliation so we can find each other.

**Ken Krugler** writes that he just got back from a month in the Himalayas (Bhutan and Ladakh). Ken lives in Hong Kong and is planning a trip to Macau, China, and East Malaysia. Ken reports that **Chris Schneider** and his wife, Cindi, joined them for part of the Himalayas trip. Chris is a graduate student, a highly paid consultant, and ultimate frisbee jock.

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by Pepper White

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Please keep those cards, letters, and e-mail coming.—**Jonathan M. Goldstein**, c/o TA Associates, High Street Tower, 125 High St., Suite 2500, Boston, MA 02110; fax: (617) 574-6728; e-mail: <jgoldstein@ta.com>

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Please send news for this column to: **Jonathan Miller**, secretary, 1708 Plaza Ct., Mountain View, CA 94040; tel: (415) 813-1100 (w), (415) 961-2394 (h); e-mail:

<jonathan\_miller@logitech.com>

# 85

Greetings everyone. I hope everyone is having an enjoyable summer.

**Steve Dusse** writes: "I'm entering my 10th year at RSA Data Security, Inc. It's been a

long uphill struggle but it looks like this important technology (invented at MIT) is finally gaining the recognition it deserves. Erstwhile, my wife, Donna, and I bought a house in Redwood City, and last October we had a son, Shane. Life is good." . . . **Ralph Hyre** is leaving CSC after six years, to become the client/server architect at Choicecare, a regional managed care firm in Cincinnati. "Consulting has been okay, and CSC has been a great company to work for, except for the travel." **Ralph** recently saw **CSC Dave Gifford**, his old UROP advisor, when he visited Open Market, and he ran into our old 8.01 professor, **Bob Hulsizer**, on the 'T'. . . . **Megan Donahue**, her husband, **Mark Voit**, and daughter **Michaela Rachel** (born 2/5/95) have settled in Baltimore, Md. They both are tenure-track astronomers at the Space Telescope Science Institute, **Megan** in the Archive Branch and **Mark** with the Faint Object Camera instrument team. **Megan** says, "I figured out how to run again after a winter that was way too long, and occasionally can be seen in the middle of the pack in local 5Ks. **Michaela** loves to sleep in and, when awake, talk a lot."

**Joan Muellerleile** and her husband, **Dumont Jones**, are living in Columbus, Ohio. **Joan** has started a third year at **Owens Corning**, working as an advanced scientist in the Science and Technology Center. Her husband is in a third year as principal of **Black Bear Software Engineering**, and is very much enjoying being his own boss. "Our 1-year-old German Shepherd, **King**, is now weighing in at a 'mere' 75 pounds, and pretty much does as he pleases," she says. . . . **Stephanie Winner** announces the birth of her fourth(!) daughter, **Kira Louise**, on February 1. **Stephanie** is still at **Apple** working on 3D graphics ASICs while husband **Jeff Winner** is now head of the network security group at **Netscape**. . . . **Janice Eisen** contributes to the **Strange Coincidence Department**. "There were, what, six or seven Course XVII grads in our class? Well, two of us had sons named **Alexander** on March 26, 1996—**Erik Devereux** and me! My second child, **Alexander Lawrence Meltsner** (my husband is **Ken Meltsner**, '83), was born here in **Johnstown, Pa.**, on March 26 at 2:47 a.m. (so we beat **Erik** by about 12 hours)." Mother and baby are doing great.

Since our reunion, **Maurice Barrant** received a master's in computer science at **Northeastern University** and changed jobs. "I have been

working at **PictureTel Corp.** for the past eight months writing client/server applications. My wife, **Jackie** (formerly **Gregory**), who started at **MIT** is now about to finish at **Mass College of Pharmacy** and will work for **Osco Drug stores**." . . . **Karen Deutsch** writes, "Well, now that you've reached the 'Ds' in your alphabetic quest for news, I guess it's time, after all these years, for me to provide some. I've been at **NYNEX** in **New York** for the last four years, since earning an **MBA** at **NYU**. I'm working in regulatory planning, where we're busy dealing with the impact of the recently-passed **Telecommunications Act**. Also, I'm busy planning my wedding on **October 13**. The lucky guy is **Steve Rowland**, a graduate of **Pomona College** ('82) and the **University of Chicago Law School**. We recently visited **Suzanne Lane** and family at their new home in **Cambridge** and made sure to visit the **MIT** campus and **Toscanini's** during our stay."

**Ed Derrick** is a postdoc in physics in **Berlin, Germany**, at **Humboldt University**, which is in the former east part of town. "This is a very exciting place to be. **Bill Saphir**, '86, has dropped by; I expect **Daniel Morgan** for a visit in the fall; and I'm trying to persuade **Surendra** to visit as well." . . . **David Ming**: "Just writing to say that I'm here in **Hong Kong** working for **Air Products and Chemicals** as an on-site development manager for **Southeast Asia**. After leaving the **Air Force** in 1989, I've spent the last seven years working for **Air Products and Chemicals**. The last year and a-half, I've been here in **Hong Kong** with my wife and 2-year-old son." . . . Send news to **Bill Messner**, secretary, 5407 Pocusset St., **Pittsburgh, PA 15232**; tel: (412) 421-4334; e-mail: <bmessner@cmu.edu> or <mit1985@mitvma.mit.edu>.

# 86

First, I'd like to thank to everyone who submitted biographies to our **Reunion Book**; our participation was the greatest of the past several **Reunion** years. If anyone would like a copy of the book, extras are available for \$19.86 from the **MIT Alumni/ae Association**, 10-140, 77 Mass. Ave., **Cambridge, MA 02139**. Your biographical information has not been used for **Class Notes**, so please keep those letters coming.

**John Hinsdale** has finished graduate school in computer science at **Columbia University** and is now running **Alma Mater Software** in **Manhattan**, making **Internet** search software for **Web servers**. **John** still plays guitar daily, and after enough exposure to **Greenwich Village** is shifting from rock to folk. . . . In **June** **Chavonne Yee** was completing an **Executive MBA** at **Southern Methodist University** and expecting to move from **Dallas** to a position elsewhere.

**James Toh** is back in **Singapore**, producing **Singapore's** first **Broadway-style Chinese musical**, featuring two outstanding young **Singaporean** composers, **Liang Wern Fook** and **Jimmy Ye**. The production, which was set to premier **July 4**, is called **December Rains** and is based on a love story between two high school sweethearts in the 1950's when **Singapore** was fighting for independence from the **British** and facing communist subversion at the same time. . . . **Randy Parker** lives in **Brookline** with his wife, **Nancy**, daughter **Allee** (2), and son **Myles**

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(4 months old). He is founder and president of Roving Software, Inc., an Internet software development company specializing in information agent technology.

Andrew Stevens lives in Manhattan, "absolutely enjoying it," having finished a PhD in electrical engineering at Columbia last year. His thesis topic was a high-speed silicon optical receive chip, and he spent his last two years in school also working at IBM's T.J. Watson Research Center. After graduating, he took six months off—traveling to Greece and Israel and visiting friends around the United States. His other big accomplishment of '95 was producing a CD compilation of music entitled, *Commemorating 30 Years of Postcrypt Coffeehouse*, which includes live tunes from folk/acoustic performers such as Dar Williams, Ellis Paul, and Hugh Blumenfeld, '79. The CD is available at Tower Records. In November '95 he started working for the Voyager Co., a multimedia publisher in Soho, which has published CD-ROMs by Laurie Anderson, Marvin Minsky, and Stephen Jay Gould. He is their director of Internet services (aka "webmaster"), and says, "The job is a blast! The Internet sure has come a long way since I first used it at MIT."

To be added to our class e-mail list, or to change your existing e-mail address on record at MIT, send e-mail to: <mitalum@mitvmc.mit.edu>.—Bill Hobbib, secretary, 5 Cappy Cir., West Newton, MA 02165; e-mail: <mit1986@mitvma.mit.edu>

## 87 10th Reunion

Hi! By the time you read this, reunion planning should be well under way. For updates, be sure to tune into the Class of '87 Web site: <<http://18.156.0.36/Class/mit1987>>. Besides reunion information, the site has archived Class Notes, as well as an e-mail directory (which is password protected). The site will be slowly evolving—please let me know what you would like to see. Credit for getting our site up and running so quickly goes to John Blake at MIT, who has taken on the task of maintaining class e-mail lists and websites in addition to his other duties. His help with this is greatly appreciated!

After all these years, Rachel Lum decided that she finally had something worthwhile to submit to our Class Notes column. She got married on September 2, 1995, to Al Gasiewski, PhD '89. They met at an MIT Club of Atlanta meeting, and she encourages everyone to go to such meetings. (Rachel is not the only one: Class President Stephanie Levin and Class Agent Jim Koenig, who didn't know each other while in school, met through the MIT Club of New York. They just had twins, though I do not yet have any details.) Among those attending the wedding from MIT were Durwynne Hsieh, '85, Chung-Pei Ma, PhD '93, Connie Moy, Una Hwang, '88 (PhD '94) and Emi Ishida, '88. Since graduating from MIT and getting a PhD in chemistry from Harvard, Rachel has spent three years as a postdoc at Georgia Tech in Atlanta.

Josef Shaoul has moved from Vermont to Holland to take a new job in the oil-field services business. He has been in touch with Jesper Otterbeck and William van Doorne, who

are also working in Europe. . . . Kimberly A. Chasteen and her husband, Doug Boyd (Georgia Tech '87, '88), had a healthy baby boy on March 30, 1996. David Thomas Chasteen-Boyd came into the world by C-section, and weighed in at 8 lbs., 6 oz. They are slowly recovering from the sleep deprivation, and their other "kids" (three dogs and four cats) have accepted David into their pack. Now the only thing that is left is for Kimberly and Doug to resolve whether David is going to MIT or Georgia Tech! Kimberly is still working as a patent attorney for NASA at the NASA Langley Research Center in Hampton, Va., and Doug is an aerospace engineer working under a NASA contract for Lockheed Martin. . . . Bradley Feld and his wife have just moved from a house in Boulder, Colo., to a ranch in Eldorado Springs, about 15 minutes from town. Their 40-acre spread in Eldorado Canyon is home to some of the best rock climbing in the world. Bradley says that his new company, Intensity Ventures, continues to make progress. More details are available on the Web: <<http://www/feld/com>>.

Christopher Monroe has written to share two articles that he has co-written while working at the National Institute of Standards and Technology, in Boulder, Colo. The first, appearing in the May 24, 1996, issue of *Science*, "A Schrödinger Cat Superposition State of an Atom," describes an experiment in which one atom is prepared "in the bizarre state of being in two well-separated positions" at once. The experiment provided a glimpse of quantum superposition states at a physical scale where they are practically never seen, and may pave the way for new experiments dealing with the apparent failure of quantum mechanics in describing microscopic systems.



*THE WEDDING OF RACHEL LUM, '87, TO AL GASIEWSKI, PhD '89, who met at an MIT Club of Atlanta meeting ~ From left, 1st row: Durwynne Hsieh, '85; the bride and groom; Matt Croughan, PhD '88; 2nd row: Fred Lam, PhD '89; Chung-Pei Ma, '87, PhD '89; Connie Moy, '87; Una Hwang, '88; PhD '94; Emi Ishida, '88; Anne Aunins, PhD '91; Sara Tom; 3rd row: Dave Dudek, PhD '88; John Aunins, PhD '89; Kip Bishop, PhD '89.*

The second, "Demonstration of a Fundamental Quantum Logic Gate," appeared in the December 18, 1995, issue of *Physical Review Letters*, and reports on the first realization of a fundamental quantum computer gate. . . . Keep the updates coming!—Jack Leifer, secretary, 116J Fairway Ridge, Aiken, SC 29803; tel: (803) 642-3900; e-mail: <[leifer@sc.edu](mailto:leifer@sc.edu)> or <[mit1987@mitvma.mit.edu](mailto:mit1987@mitvma.mit.edu)>

## 88

Hello classmates! I hope you are enjoying the fall and not having that dream again. You know, the one where you wake up and you realize that you are an hour late for a

final exam in a class that you forgot that you registered for and have never attended.

Jim Casamento married Eva Csizinszky last September. Jim and Eva met while they were both attending the MIT Leaders for Manufacturing program. Jim recently changed jobs at Polaroid Corporation and is now working for the director of manufacturing strategy, helping to develop an integrated manufacturing strategy for the company. In March Jim and Eva attended the wedding of John Griffith and Margit Finck. The weddings gave Jim a chance to get news on his SAE classmates: Tim McGonagle is working for Symbios (a division of Hyundai) in Fort Collins, Colo. Hyundai bought this company from AT&T, which bought out NCR, the original company that hired Tim. Bill Malecki is enjoying life in San Francisco and working in product development at Heartport of Redwood City, Calif. Chris Moreno and his wife, Diane, are both working at Motorola in the Chicago area. Chris is attending law school in the evenings.



**Anthony Fortunato** has moved back to Boston after several years in New York City. He works at ITG, a company which acts as an electronic broker between buyers and sellers of stocks. **Bruce Mihura** is working as a customer contact engineer at National Instruments. He helps clients who are using LabView, a neat product that Bruce helped develop. **John Griffith** is working at Northern Research and Engineering (a division of Ingersoll Rand) in Woburn. **Scott McFarland** is working at Tighe and Bond, an environmental consulting company in Westfield, Mass., and living in western Massachusetts. He and his wife, Becky, are expecting in the fall. **Bill Kennedy** is working at Highway Master, a small company in Texas that uses satellites to track the location of trucks throughout the country. **Ed Rubesch** couldn't make it to either of the weddings because he is working for Lear Seating in Bangkok, Thailand. He and his wife, Phatcharain, are also expecting. **Jim Burch** is living in Albany, N.Y., where he is in the third year of a residency in radiology.

**Tom Kronenberger** and wife, Janelle, gave birth to their firstborn, Shannon Marie, on March 12. Everybody's doing fine. . . . **Yakov Royter** and Lori Ainbinder were to be married on August 4 on Long Island. . . . **Michael Tuchman** married Margaret Knowles of Goldsboro, N.C. Michael earned an MS in math at UNC/Chapel Hill and is currently working as an educational consultant for One Room Systems, Inc., Durham, N.C. . . . **Christopher Cook** had a paper selected to be presented at the Suffolk Law School Academic Convocation. While in Boston, Christopher plans to swing by the boathouse before heading back to Florida. . . . **Alan Maestri** is employed by Watson Wyatt World Wide as a programmer for the actuarial consulting firm. He is also a member of the Troy Jaycees. — **Catherine Suriano Singer**, secretary, 131 Main St., Andover, MA 01810; e-mail: <singer@alle-gro.mit.edu>

# 89

Happy Halloween! The only news I received from the Alumni/ae Office this month was a press release that I forwarded them last month about the MITers selected for the astronaut corps. But thanks again to everyone who sent e-mail. This month's list of people to please send news is: **Husni Idris, Daniel Kopye, Galia Meiri, Curtis Patton, Scott Schwartz, and Melanie Violotte**. What are y'all up to? If anyone knows about any of these people or anyone else, please write in.

**Dean Fiala**, one of those asked to write in a few months ago, has been living in San Francisco for two years. Dean has been married for 10 months (as of July) to Cheryl Peirce (Wellesley, '88) and is "enjoying the tethered state. We were married in Pittsburgh and had a quick honeymoon in New York City. We took a train both ways and accidentally rode a bit of history as we took the last Chicago-bound Broadway Limited (direct service from Chicago to NYC is no more). A badly scheduled business trip for Cheryl's company forced us to Chicago immediately afterwards. The trip was rescued by a gorgeous afternoon playing hooky at a Cubs game (the Cubs beat the Dodgers 7-6 in 13 innings)." Since then, Dean has been working pretty much nonstop as a

software consultant, developing PC-based applications, and is currently working on projects for the Union Bank of California and Applied Materials. "But mostly I dream of a long vacation, preferably somewhere without phone service or electricity."

Dean reports on some friends in and around the San Francisco area: **Isidro Gonzalez** is doing some quick apartment hunting for his impending move. . . . **Joe Chung** was supposed to escape NYC for the glories of San Francisco, but ended up back in Boston. . . . Dean caught up with **Heather (Huber) Cogdell** between one of her many trips for Deloitte & Touche. Heather is living in Virginia with husband, Maurice, but managed to avoid most of last winter while on a project in Puerto Rico. . . . **Tom Winter** and his wife, Ann, of Manitowoc, Wisc., are parents the second time around with the arrival of Rachel Renee.

**Sam Druker**, who is now at Cygnus in Mountain View, Calif., reports that other '89ers are there as well: **Mark Eichin, Nancy Gilman, Sayan Chakraborty** as well as Jeff Bigler, '87, Ken Raeburn, '88, Mark Horowitz, '90, and Chris Provenzano. Nancy, who is in the East Coast office in Somerville, Mass., reports that there is not a single person in the East Coast office without an MIT connection.

**Peter K. Tan** is a manager of business development at Emerson Electric Asia-Pacific in Hong Kong. In June, **Teri Centner**, left McClellan AFB and drove cross-country to Northern Virginia. "At my new assignment with the Defense Information Systems Agency, I will be a software configuration manager for the Joint Theater Level Simulation (JTLS) Program. JTLS is a wargaming program that the Joint Chiefs of Staff use to predict how future conflicts might turn out. The actual programming is done in Monterey, Calif., and is then sent to Northern Virginia to be beta-tested and then distributed to customers throughout the Department of Defense." Teri serves as a liaison between the software developer and the JTLS users.

**Michael Camitta** writes that he graduated from the University of Texas Health Science Center at San Antonio Medical School in Duke. Mike started a residency in Pediatrics at Duke University Medical Center in June. Mike and wife Debbie were married in San Antonio on June 19, 1993. . . . **Louis Toth** is currently a postdoc at MIT, having gotten his PhD in neuroscience last year.

**Tony Fiorino** graduated from the MD-PhD program at Albert Einstein in June and headed to UPenn for an internship in internal medicine. Tony writes, "I am currently interviewing across the Northeast for dermatology residency positions to start July 1997; hopefully, I will get a position in an academic program that will let me do some research during my residency." . . . Since graduating from BU film school in '94, **Ben DeSousa** has been doing freelance film and video work in the Boston area. Ben writes, "In 1994 I traveled with a small crew to Ecuador to film a documentary. I co-edited the piece for the next year and a half, in between paying jobs. The film was recently finished and is being broadcast nationally during the week of May 10-16 on a syndicated TV show on PBS called *Tony Brown's Journal*. The film itself is titled *Lost Africans of the Andes* and is about a half an hour long. The show is on in roughly 200

# ClassNotes

cities across the U.S."

Well, that's it again for this month. More members of the class have home pages, so be sure to check out the '89 home page at <<http://www.tns.lcs.mit.edu/mit89/>> and send your URL if you have some info. For those of you who actually send in real U.S. mail, please note my address change.—**Henry Houh**, secretary, 70 Amherst St., Cambridge, MA 02142; tel: (617) 225-6680; fax: (617) 253-2673; e-mail: <[hjh@mit.edu](mailto:hjh@mit.edu)> or <[henry\\_houh@mit.edu](mailto:henry_houh@mit.edu)>

# 90

I want to start off this column with a message from class president **Eric Miller**: "I want to alert people that we are trying to get a Class of '90 Web page together and would like

to get input from members of the class regarding e-mail addresses, Web addresses, pictures from the reunion, etc. Also, if anyone knows how we can get the original artwork for the front of our brass rat, have them contact me at <[elmliller@cdsp.neu.edu](mailto:elmliller@cdsp.neu.edu)>. The class home page should be up around the end of July and can be accessed through MIT at the Web address: <<http://web.mit.edu/alum/www/>>. There should be forms on the page for relaying contact information or people can just e-mail me directly." You can always send updated information to your trusty secretary, and I will forward it to the MIT Alumni/ae Office. I know I'm looking forward to the Web page and encourage you to check it out!

A news release from the President's Commission on White House Fellowships brings the news that **Elisabeth Stock**, now a consultant at the World Bank, is one step away from landing a White House fellowship. The prestigious program brings outstanding men and women to Washington for a year to work with senior White House staff and Cabinet secretaries. Liz earned 4(!) degrees at MIT (SB2A, SB21E, SM11T, and MCP11M) and represented the World Bank at the World Bank XXth World Road Congress in Montreal in September 1995. Best of luck, Liz!

**Gay (Martin) Thompson** writes in to update us. She has spent the last four years serving in the USAF at Los Angeles AFB. She was married to Lee Thompson in January in Austin, Tex. She is planning to move to San Jose in June when she completes her Air Force service and will be working for KLA Instruments. . . . **Paul Livesay** (Course I, ATO) is out on the West Coast. After Duke Law, he worked for an LA firm before heading to Silicon Valley legal powerhouse, Wilson, Sonsini. He is now legal counsel for RSA Encryption Technologies. He and I got in the pool for a little reminiscence of old times on the water polo team. . . . Also from water polo days, **John Oyler** (Course II, LCA) is out here working for McKinsey in Menlo Park. He picked up a MBA from Stanford. "I have not been in a pool recently, but did play intramural water polo at Stanford while in business school. It was awesome. We played the swim team and killed them (quite surprising)." I've seen the



Stanford swimmers, and I don't believe him for a second.

**Alex Rosen** and I had a chance to catch up during a hilly jog together. Alex just graduated from the Stanford Business School. After Labor Day, he'll be starting work at Sprout Group, a venture capital firm that invests in a variety of industries, including high tech, life sciences, healthcare services, and retail. His job is to focus on the high-tech industry, looking for new investment opportunities and working with existing portfolio companies. Currently, the firm has about \$500 million of capital under management. Sprout was founded in 1969 and is affiliated with the investment banking firm of Donaldson, Lufkin and Jenrette. It has offices in both New York and Menlo Park.

**Ken Battige** got in touch. "I have been living in Germantown, Md. for a few years now, and even bought a house almost two years ago. I got married to a beautiful young lady, Jocelyn, from Maine a little over two years ago (Todd Bryan best man, Andrzej Skoskiewicz, and Les Kalman, '91, also participating) and we have settled down here, at least for now. I am still working for the U.S. government; now with spent nuclear fuel." . . . **Alissa Fitzgerald** had **Julie Ask** drop in on her in Palo Alto as part of her trip around the west and the world. Julie has just finished up an MBA from Michigan and is traveling before hitting the salt mines of the working world.

**Pillan Thirumalaisamy** (SAE) also got in touch and it sounds like things are going well: "I have just received an MBA (June '96) from the Anderson School at UCLA. I will be staying in LA and have partnered with Joe Tang, ATO '89, at Guidance Solutions <<http://www.guidance-inc.com>>. Our firm is focused on helping mid-sized firms take

advantage of the Internet. **Irene Wang** was in my MBA graduating class at UCLA and will also be staying in the LA area working at AT Kearney. I have also recently spoken with **Frank (Trae) Shattuck** (SAE) who has just finished his first year at the UT/Austin Business School, and is working in the Bay Area over the summer at Bank of America." . . . **Desmond Davis** has also finished an MBA at UT/Austin and is now with HP out here on the West Coast. A bunch of Bakerites got together for a welcoming happy hour. I saw **Julie Wissink** and her hubby **Sayan Chakraborty**, '89, **Laura Fleming**, **Sam Druker** and his wife **Anna (Cinniger) Druker**, '91, **Denis Gulsen**, '88, and his fiancée, **Suzette Pimentel**. **Dave Berners** was there as well.

**Beverly Saylor** sent in the following update. "I just had my own little trip to the tropics—well not exactly the tropics, Georgia. I had a job interview at West Georgia College and have received an unofficial job offer from them. This fine institution has the distinction of having denied Newt Gingrich tenure. I have also won post-doctoral fellowships at UCLA and Wisconsin, Madison. Well back to my thesis. The defense date is set—July 31. Yahoo! At least one thing is sure, I am ready to leave MIT." A few weeks later, the big news: "I turned down the position at West Georgia College. I leave for Wisconsin in September." Congratulations, Bev!

**Yvonne Grierson**, who is leaving 3M and heading to med school at U/Minnesota, sends in the following news about **Cathy (Sybert) Olkin**, '88. "Cathy's doing well—just finished up a PhD and is working at Lowell Observatory—she switched from aero to something like astronomy."

I write this edition from lovely June-time Stanford. Been having a great time between

exams and the start of work. I've been spending a decent amount of time trying to whip this tired old body back in to shape. Hoping this column find you in good health, your humble servant: **Max Ochoa**, secretary, 10726 Red Arrow Hwy., Bridgman, MI 49106; tel: (415) 497-6902; e-mail: <[mochoa@leland.stanford.edu](mailto:mochoa@leland.stanford.edu)>, <[mit1990@mitvma.mit.edu](mailto:mit1990@mitvma.mit.edu)>

# 91

Greetings from your new class secretary! Our 5th Reunion was a few weeks ago and during that time, new officers were elected for our class. The new officers are: president, **Brian Katz**; VP, **Sharra Davidson**; treasurer, **Laura Moore**; and secretary, **Lola Lohr**. While the class of 1991 turnout was a little disappointing, at least we did relatively well during the Tech Challenge Games. (Just don't ask about the mock 2.70 contest—we were put to shame!) Our best turnout was at the Saturday night event, which was a dinner held at the MIT Museum. I think about 56 people came. In fact, due to the good turnout, elections were held Saturday night instead of Sunday morning.

First, I want to clarify some news about me that was incorrectly reported in the July 1996 *Technology Review*. Yes, I am working for Oracle in Denver now, but I never did make it to Kansas City. Luckily, I have been working for a client locally. My husband, **Rob Lohr**, '89, and I really like Denver and are currently in the process of having a house built. Also included in this issue of the *Review* is my wedding picture. Rob and I were married on June 17, 1995, in Highland, N.Y. We honeymooned in Alaska and it was awesome! Enough about me.

The Materials Research Society presented one of eight 1996 Spring Graduate Student Awards to our very own **John Chen**. John's presentation was a discussion of "The Morphology Diagram of a Poly(styrene-b-hexyl isocyanate) Rod-Coil Block Copolymer." Although I am not sure exactly what this means, John, if you are out there, feel free to drop me a line and let me know and I promise to report it in the notes. In another winner's circle, we have **Paul Wang**, '95, and too-many-degrees-to-mention, who won both first and third place prizes in the "TransPavillion 94" design competition sponsored by Grace Construction Products.

**Wilson Hu** was married June 15, 1996, in Wisconsin to **Gorette Sloat**. Wilson and Gorette met in Thailand while both were in the Peace Corps. Wilson works as a civil engineer in Minneapolis, where he and Gorette live. They held their weekend wedding celebration on the Island of Happy Days! Definitely a good omen. Attendees of the wedding from MIT were **Alyssa Parker**, **Shanna Kovalchik**, **Rob Lohr**, '89, and me. Alyssa graduated with a master's in architecture from MIT last June 1995 and has been working in Mass. as an architect, working



## THE WEDDING OF LOLA MATYSIAK, '91, TO ROB LOHR, '89 ~

Front row, sitting (left to right): **Lambert Devoe**, '92; **Monique Lawrence**, '92; **Wilson Hu**, '91; **Laura Pitone**, '91; **Chuck Venditti**, '88; **Penny Fusco**, '90; **Andy Fusco**, '90; **Debbie Bein**, '90; **Alisa Mosler**, '91; **Jason Jonas**, '88; **Allison Jaynes**, '90; **Sharon Novak**, G; **Steve Barrett**, '89. Second row: **Jack Kotovsky**, '90; **Armando Fox**, '90; **Dave Guell**, G; **Chevy Vithiananthan**, '88; **Josh Spielman**, '88; **Mike Roberts**, '87; **Lola and Rob Lohr**; **Mike Dorsch**, '90; **George Cathey**, '88; **Mike Powers**, '91; **Eric Nudelman**, '90; **Scott Jaynes**, G; **Tom Cole**, '91; **Laura Venditti**, '90. Back row: **Eric Oliver**, '90; **T.J. Cradick**, '88; **Paul Wysocki**, '89; **Chris Massa**, '90; **Geoff Kelsch**, '87.



on the design of a brand new city in Malaysia. Shanna has been in Seattle at the University of Washington working on her master's degree—she expects to be there for at least another year or two.

Marc Bailey is playing soccer for the Worcester Wildfire, the farm team for the New England Revolution. He is, of course, kicking some butt—no pun intended—and let's wish him the best of luck in furthering his professional soccer career. And if Kent McCord, '91, is reading this, just want to let you know that Hannes Smarason would like to catch up with you. Last I heard, Kent was working as an engineer somewhere in Connecticut. Hannes is a consultant for McKinsey, but is temporarily working with his dad back in Iceland.

Hopefully, you have all heard about (and are using) the new E-mail-For-Life (EFL) offered by the Alumni/ae Association. EFL is being piloted for our class and the class of 1996, and if all goes well, it will be offered to the rest of the alumni/ae. Basically, it is an e-mail address that you can use as a pointer to whatever your current e-mail is, and so as you move around, your friends will only need to remember what your EFL address is in order to reach you. Also planned is an online alumni/ae directory, similar to the *Alumni/ae Register*. More news on this as I find out what the schedule is.

It is pretty strange writing this in June, knowing that you will be reading it in October. I encourage anyone to e-mail or call me with any news, or run the risk of having me write only about the people I know and have seen in the past few months—and I don't think anyone wants this to happen! I look forward to your news and to writing this column.—Lola Lohr, secretary, 9835 Reed St., Westminster, CO 80021; tel: (303) 889-8746; email: <llohrr@us.oracle.com>

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## 5th Reunion

Chris Young writes: "Hey Leslie! I've been meaning to write you. In fact I kick myself

for not looking you up when I was home for Xmas in Denver. I totally forgot you were there—and I've been looking for someone to go skiing with. Right now I've got my hand in a whole bunch of things. I'm living in the Chicago area and am in my third year here at Northwestern University, getting an MFA from the Department of Radio/TV/Film. I have finished all of my course work and have to finish my thesis work to receive my degree. My endeavors have me working in several different areas: filmmaking, digital media, and teaching, among others.

"I am in the process of starting one of my thesis projects—a 30-minute experimental narrative to be shot on film and which will integrate 3D computer animation and digital compositing. Several short works of mine have been screened at various festivals including a video which will be shown at the National Poetry Video Festival here in Chicago in April.

"Most of my free time has been consumed with working on the Web. I have so much business consulting and designing Web sites (I have to turn work down) that I have started a company called OMNIBUS:EYE media to handle

my commercial jobs including some video production for hire jobs. Right now it is just me and a few friends who work for me freelance—but I may be getting more serious after I get my degree. I've decided that I really don't like working for anyone else. I am going to be documenting the entire process of my thesis film online at the OMNIBUS:EYE site so that people can check back weekly to view the whole process of a film being made from original idea conception to the final film print. In addition to my personal Web projects, I have designed several commercial/educational sites and am consulting for an online exhibition of various artists to be presented at a conference in Valencia, Spain (unfortunately I can't go). I am also working in interactive multimedia and nonlinear storytelling, and intend to produce a second thesis project that will be an interactive project on CD-ROM.

"I am also currently a lecturer teaching two courses (video production and computer animation/multimedia) for Northwestern University College. This past summer I designed and taught a new screenwriting program for high school students hosted here at Northwestern. Well, if anyone is passing through Chicago, they should look me up. I'm looking forward to the reunion in '97. Let me know if there is anything I can do to help—especially if I can offer Web assistance."

Charlie Choi has been in charge of the powdertrain on a luxury-concept car for the past year. He has been playing lots of tennis and been camping, too. Charlie is also leading a bible study group and singing in his church choir. He sends news of other Sigma Chi's. . . . Dave Chase is working for an environmental engineering firm in Kansas City. . . . Patrick Chu just started at UCLA this fall for his PhD. He was working also part-time at a research job at Jet Propulsion Lab in Pasadena.

Goffe Deane is still at Santa Barbara with hopes of finishing his PhD in June '97 (hopefully before the reunion). He's doing research on contaminant transport in the Green Bay water system, specifically on the sorption of hydrophobic organic chemicals to packed river bottom sediments. It's exciting work he says because it has major implications for soil remediation everywhere. He says, contrary to popular belief, it takes years to remediate contaminated soil. Goffe has also spent the little free time he's had swimming and playing racquetball and has also taken up scuba diving. Goffe says, "The Channel Islands off of SB are world class dive sites, and you wouldn't believe the rush to dive with the sea lions and dolphins. Lobster season has been fun too as we've been going down on night dives about once per week."

John Demerly is still working for General Motors at what is now called the Small Car Group. He is responsible for the steering systems of all the current production cars which includes the Chevy Cavalier, Pontiac Sunfire, Pontiac Grand Am, Olds Achieva, Buick Skylark, Chevy Corsica, and Chevy Beretta. He and Dawn are doing better than ever and still living in Lansing, Mich. Dawn is working on a master's degree at Michigan State in the social work program. When she finishes, John plans to return to MIT next fall in '97 to pursue a PhD in engineering.

Alou Macalou recently finished another three-month stint at NASA Ames Research Center in California. He was in his third year

# ClassNotes

of a fellowship from Georgia Tech. He is also maintaining a site on the World Wide Web called the Universal Black Pages <<http://www.gatech.edu/bgsa/blackpages.html>> The site is doing really well and he's been asked to be a guest celeb on GNN's *Whole Internet Catalog* and he gave an interview to a reporter from *C/Net*—an electronic magazine. Other distractions for Alou include being the chairperson of the Black Graduate Students Information Committee. They offer classes on Unix, e-mail and the World Wide Web. And he's planning a business in West Africa and trying to publish his dad's children's book. He's planning to be in Atlanta for the next five years and during that time perhaps become a math lecturer in local universities for which he hopes to get a master's degree in mathematics in addition to the PhD in aerospace that he's working on. Alou owns a house in Atlanta too. Wow! Busy guy!

Gregg Motonaga is working on starting med school. He is working as a medical assistant at a local clinic in Anchorage. . . . Mike Olivas is living in Austin, Tex., working at IBM. . . . Kevin Scannell is trying to finish up his PhD and apply for jobs at a whole bunch of colleges and universities. . . . Scott Wetzel is running his family's dry-cleaning business in Billings, Mont.

Goff Kuziemko just started his fifth year of graduate studies in chemistry at Berkeley. Afterwards, he is planning on going to law school and then hopefully practicing patent law. . . . Ken Chestnut is working for Ford in Detroit. . . . Charisse Russell is working for GE Aircraft Engines in Cincinnati. She is engaged to be married May '97 to Julian Renfro, Jr. in Coral Springs, Fla. Congratulations!

Heidi Goo writes: "I can't believe it's been four years since we graduated from MIT. I just graduated from Howard University College of Medicine. I will be going to the University of Hawaii to do a residency in family practice. I am looking forward to moving to some place that does not get snow. On April 19th, I married Bob Rockwell, '93. We recently returned from our honeymoon in St. Thomas and Virgin Gorda and a trip to Boston for the Delts lobster trip. On the lobster trip, we saw Ruth (Bunker) Lathi and Dinesh Lathi. Ruth is graduating from UC/SF med school and will be doing an OB/GYN residency at Baylor. Dinesh is graduating from Harvard Business School. We also saw Matt Hockett who is graduating from the U/Minnesota and will be staying in Minnesota for his residency in family practice. Jeff Jacobson graduated from NYU Medical School and will be staying at NYU for his residency in internal medicine/general practice. CJ Whelan, Mike Pieck, Scott Rickard and Kyle Hanley were also in town for the lobster trip.

"Jackie Moore, Elaine Lo and Matt Mullins were at my wedding. Jackie is in the Air Force and is stationed at Los Angeles AFB. Matt is in the Air Force and is stationed at Kirtland AFB in New Mexico. Elaine is graduating from law school at Northwestern and will be working in Milwaukee." Congratulations to Heidi and Bob as well as all the new MDs!



# Puzzle

Continued from Page MIT 55

placed anywhere on the board. When placed on the edge, there are six squares available to place the 4 queens. In cases of  $N > 6$  I arranged the position of the queens first. I started by placing the queens in a compact group in one corner of the board. I selected the corner since then I had only one diagonal width of the group to minimize while I was also attempting to minimize the row and column widths of the group. Tight packing of the queens assured that certain squares would be attacked many times while leaving others free. As each queen attacks  $3N-2+2E$  squares, where  $E$  is the distance in squares of the queen from the edge squares of the board, a few widely distributed queens can attack large numbers of squares. Five queens, properly placed, can attack every square of a  $N=11$  board. Upon examining my placement of queens in the corner, I found, in some cases, their grouping could be made improved by relocating certain queens on the edge of the group so the group would have a slimmer appearance viewed along a row, column, or long diagonal of the group.

**M/J 2.** Just before mailing this problem to me in March '93, Eugene Sard purchased a bunch of 29-cent and 23-cent postage stamps and was surprised to note that the total was a (non-zero) whole number of dollars. What is the smallest number of stamps that Sard could have been purchasing?

The following solution is from Mark Seidel. The general equation to solve is  $29n + 23m = 100k$ , for some integers  $k, m$  and  $n$ , such that  $n+m$  is minimized. Taking the general equation modulo 23 and then modulo 3 yields  $2k \bmod 3 = 0$  so  $k = 3r$  (for some positive integer  $r$ ). Taking the general equation modulo 23 and then modulo 8 yields  $6n \bmod 8 = 0$ , so  $n = 4p$ . Taking the general equation modulo 4 yields  $n+3m \bmod 4 = 0$ , so (because  $n=4p$ )  $m = 4q$ . Plugging these relations into the general equation yields the reduced equation  $29p + 23q = 75r$ , which when taken modulo 23 yields  $6(p-r) \bmod 23 = 0$ , i.e.  $p = r + 23s$ . Plugging this equation back into the reduced equation yields  $q = 2r - 29s$ . Minimizing  $n+m$  means minimizing  $(n+m)/4 = p+q = 3(r-2s)$ , which must be positive (and therefore 3 or greater). One obvious solution is  $s=0$  leading to  $(p,q,r) = (1,2,1)$  making  $p+q=3$ , so this must be a minimal solution. The solution to the original problem is therefore

four 29-cent stamps and eight 23-cent stamps costing 3 dollars.

**M/J 3.** Nob Yoshigahara wants you to factor 123456789 into two five digit numbers.

The following solution is from Leonard Nissim. The two factors must both be fairly close to the square root of the original (about 11111.111), since both are over 10000. Clearly 123456789 is divisible by 9, as the sum of its digits is 45. Since  $123456789/9 = 13717421$ , we are reduced to finding two factors of 13717421 which are close to its square root (about 3703.704). Dividing it by primes close to that value yields  $1371721 = 3607 \times 3803$ , and the solution is three times each of these primes, namely  $123456789 = 10821 \times 11409$ .

## Better Late Than Never

**1995 A/S 2.** James Datesh and Bob Sackheim each found two errors. The entry for 16A should be 3419 and the entry for 25D should be 1815.

**1995 Jan 1.** This is quite amusing. We asked if there are infinitely many numbers that can be formed using their own digits in a non trivial way. Dave Pecora and Ethan Rappaport each responded with a family of solutions. The amusing part is that the base of Rappaport's solution is 117,648 and the base of Pecora's is 117,649.

Rappaport notes that  $117648 = (7^6 - 1^{48}) \times 1$ , and hence  $1176480 = (7^6 - 1^{48}) \times 10$ , etc. Pecora starts with  $7^6 \times 1^{49} = 117649$  and then adds six zeros to get  $7^6 \times 1^{4900000} = 117649000000$ , etc. Can anyone find a family where the number of nonzero digits grow without bound?

## Other Responders

Responses have also been received from J. Abbott, H. Amster, R. Ball, L. Bell, J. Bush, F. Carbin, D. Diamond, S. Feldmen, E. Friedman, A. Gutttag, J. Harmse, T. Hartford, R. Hess, H. Huang, H. Ingraham Jr., J. Kenton, M. Lindenberg, C. Muehe, R. Nelson, A. Ornstein, M. Perkins, G. Perry III, D. Plass, R. Ruiz, D. Savage, A. Shagen, P. Silvenberg, K. Stahl, A. Taylor, D. Thresher, and C. Whittle.

## Solution to Speed Problem

$f(x) = g(x) - x$  where  $g(x)$  is the number of LCD elements in  $x$ . [I was personally baffled by this answer until I realized that LCD does NOT mean least common denominator (think calculator)—ed.]

the bridesmaids. Christine Ma, Kortney Leabourne, Denise Purdie, Aileen Lee, Barb Sigmund, and Shari Schuchman were there too. Denise brought her son Tyler. Daphne Karydas, '93 and Sharlene Day, '91 were also there. . . . Michael Gull moved to San Jose in May.

I need to apologize for not getting this news to you all in the last issue. I was out of the country—in Russia to be specific. It was a great time, but I'm sorry that I was not able to

get an update in before I made my preparations to leave. After Russia, I went to Helsinki to the Helsinki University of Technology where I was once again hooked in and could keep in touch. Thanks for being so diligent about writing. Hope you are all getting excited about the reunion. Now, it's only nine months away! Hope to hear from some of you who have been laying low for the last few years. Where are you Andrew Cameron? James Bohan? Mark Bowers? Rob Noah? Write in and let us know what's going on.—Leslie A. Barnett, secretary, 2644 Vrain St., Denver, CO 80212; tel: (303) 433-4476; <e-mail: labarnet@ouray.cudenver.edu>

# 93

It is with great sadness that I tell you Anthony Sykes died of cancer this February. I heard of his death from Madhavi Gupta as well as from MIT.

He will missed by his family, his friends, his class. I received a copy of his memorial service. If anyone is interested in having a copy, send me your address and I will be happy to mail it to you. I hope to have more information about Anthony to include in Class Notes. Please help me achieve this.

Jim Lee has decided to work over the summer for McKinsey & Co., an international management consulting company, in their Los Angeles office. . . . Amy Chiang, who also attended the University of Chicago Business School with Jim, will work for Booz-Allen & Hamilton, another international management consulting company, in New York this summer.

Last summer Ivana Markovic drove to the West Coast with Chandler Harben, '95, and two other friends. They visited many MIT people on the way. Diane Hern and Paul Anderson, '90, live on a beautiful country farm; Diane is working and Paul is in law school. Ivana also saw Andrew Moore and Troy Morrison in Austin. In San Francisco she attended Alicia Gruber's wedding to Jim Kalamas, '91, as a member of the wedding party. After driving back east, Chandler and Ivana backpacked in Europe for five wonderful months, mentioning stops in Paris, Yugoslavia, Rome, and Barcelona. Now she is living in Atlanta working as a scientist for The Coca-Cola Co., and gearing up for the Olympics.

Claude Denton and Carrie Huguenin were married on February 17, 1996, in her hometown of Falmouth, Mass. Colleen Johnson, Kim Kohlhepp, and Kevin (Pelican) Schutz-Mullican attended. Says Carrie, "I didn't even mind the snow that much, I certainly had the advantage of camouflage in the ensuing snowball fights, since I was the one in the big, white dress!" Colleen came all the way from Munich, Germany, to be in the wedding. She's in Intel's engineering rotation program, and Munich was one of her rotations. Claude and Carrie continue to live in Portland, Ore. He's at Tektronix and she's working for Intel.

Andy Howe moved out of his condo in Natick and bought a ranch house. Now he has more than enough space to continue wood-working and breeding dogs. He has three huskies, two malamutes, two wolf/malamute hybrids, with more on the way. . . . Bob Rockwell and Heidi (Goo) Rockwell, '92, were married on April 19, 1996, in Georgetown. In attendance were: Mike Mini, Rebecca, '94,

Chrissy Kwon wrote about more new doctors from our class including herself. She will be doing her residency at NYU in OB/GYN and is very excited. . . . Brian Hines will be doing his OB/GYN residency at Mt. Sinai in NYC. Lisa Arel is doing her pediatrics residency at UCSF.

Chrissy recently attended Stacy (Holander) Gleixner's wedding. Jean Condon was the maid of honor and Cindy Evanko was one of



and Chad Gunnlaugsson, Kerry Rosenhagen, Mike Doane, '92, Ken Justin, Amanda Morin, '94, Chris and Heather Morin, both '91, Holly Goo, '95, John Westlund, '94, Brian Sawyer, Jackie Moore, '92, Elaine Lo, '92, and Matt Mullins, '92. Bob and Heidi will be moving to Hawaii where she will be doing a residency in family practice. Bob is finishing a master's degree at UVA this summer and will be moving to Hawaii in August where he will work on a PhD with his professor at UVA.

**John Baker** and **Arik D. Brown** are working towards PhD degrees at the University of Michigan. . . . **Jong Min Lee** finished up an MSME from Stanford in June and is working for Apple Computer's Imaging Division for a few years. . . . **Steve Chamberlin** just moved from Boston to the San Francisco Bay area, and is enjoying the sunny West Coast weather immensely. He is beginning a new job at Salamander Interactive, designing educational simulation software to complement high school and college science classes. . . . **Madhavi Gupta** spent a year working at MCET in Cambridge, then won a year in Prague on a National Security Scholarship, and is now in medical school at the University of Tennessee in Memphis where she is president of her class. For Spring Break Madhavi went to San Francisco and had the pleasure of seeing friends, **Geetha Krishnan** and **Justus Grimalda**, '92.

**Martha Bulyk** is now a third-year graduate student in the biophysics program at Harvard. She has finished all her requirements, and so now she's doing research for a professor in the genetics department at Harvard Medical School on DNA-binding proteins. Since Martha is collaborating with a company near San Francisco, this March she had the opportunity to see quite a few MIT alums. Her trip started with a stopover in Detroit, where she saw Becca Scramlin, '94, who's working for General Motors, and Scott Corrington, '92, who's working for Ford. From there, Martha went to LA for a conference. While in LA, she met up with **Karen Kaplan** who works at the business desk of the *LA Times*, writing articles and a regular column. Martha also saw **Jeanine Walters** and **Sridhar Venkatesh**, who is engaged and planning a wedding in India for September. He and his bride will live in California. After the conference, Martha spent two days sight-seeing in San Francisco with **Ruth Huang** and **Mini Gupta**, both of whom work for Oracle. At Sunnyvale, Martha saw **Kevin Yu**, a graduate student in the Electrical Engineering Department at Stanford University. Back home in Boston, Martha is in touch with **James Sarvis** and **Keith Randall**, both third year graduate students in Course VI at MIT and still playing ultimate frisbee. They all went skiing this February in Colorado, where she met up with **Kate Bergeron Gull** and **Mike Gull**, '92. Last year Martha saw **Cherry Wong-trakool** when she could tear herself away from medical school at Cornell to visit Boston.

**Otway Louie** is wrapping up his third year and is trying to decide between cardiology and surgery. Otway and his brother **Kenway Louie**, might try to trip on over to China and Taiwan over their break between third and fourth year. Kenway's starting work on a PhD at MIT—trying to determine how the sense of position is mapped out in the brain. . . . **Oliver Chen** is coasting in his third year rotations on his way to radiology, while **Conrad Wang** is tooling away in the final days before part 1 of

medical boards. . . . **Henry Lu** works for GM in Detroit on steering columns and is headed for grad school out at USC for a master's. . . . In Boston, **Karen Lee** is starting her rotations as part of the HST program at Harvard, currently doing radiology. . . . **Karen Oda** is out at UCLA Medical School starting her surgical rotations and was recently out on the East Coast to present her research at the NIH. . . . **Gina Kim** is in NYC for medical school along with **Vinuta Mohan**. . . . **Mary Tschoi** is wrapping up her third year at Tufts Med and is headed into surgery.

**Steve Wiggins** was seen at game seven of the Seattle Sonics series holding a sign that said "BELIEVE" on national TV; he's heading to Wharton next year for B-School. . . . **Jon Li** will be in Philly this summer, and will also be rowing in the Hong Kong Dragon boat championships in China before returning to Tufts grad school here in Boston. . . . **Sean Wang**, **Kenway**, **Otway**, and **MJ** were on the "Beaver Boat Club" dragon boat that won the Boston championships, and are going to NYC in August for the national championships.

**Ert Dredge** transferred from a PhD program in computational biology to a master's program in software engineering at the University of Houston's Clear Lake campus. He is also starting to get back into radio now on the Rice University campus station. . . . **Jon Claman** just got back from a wonderful two-week vacation. He, his dad, and almost 90 other people, rode their bicycles from San Francisco to Salt Lake City. The 800-mile trip took 10 days of biking, passing through Lake Tahoe and the Nevada desert. Jon has been working at S3, Inc., in Santa Clara, Calif., since he received a master's in engineering in '94. He started out as an applications engineer, and recently switched to product marketing manager. Jon also shared an apartment with **Jason Cornez** for a year.

I am always on the lookout for more news to tell you all! Please let us know what you're up to.—**Mari Madsen**, secretary, 26 John St. #3, Brookline, MA 02146; tel: (617) 734-0717; e-mail: <mmadsen@opal.tufts.edu>

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Please send news for this column to: **Jeff Van Dyke**, secretary, 6000 Shepherd Mountain Cove #1401, Austin, TX 78730; e-mail: <jvandyke@trilogy.com>

# 95

Hi everyone! As you start new jobs, new graduate programs, etc., make sure you send me your updated e-mail and address information. I'll make sure that it gets to the right

places!

Speaking of moving on, **Gwen Lee** provided this update about the Chem E Practice School folks: "**Shinya Fukuda**, **Fouad Saad**, **Patrick Piccione**, and I are going to Merck for the month of June and Molten Metal Technology for July and August, while **Yee-Chuan Koh**, **Anna Chwang**, **Augustin Martinez**, and **John Paschkewitz** are going to Molten Metal Technology first for one month, and Dow Chemical for the latter two. Boy, isn't this going to be a great, fun, and productive summer! On a personal level, I will be starting my full-time

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position at A.T. Kearney in New York at the end of September. I am very excited that I will be joining the New York crowd and I hope it is going to be a lot of fun."

**Clara Yang**, who got an MS in mechanical engineering this June, is planning to travel cross country with **Brian Dye**, '96. She will be in Atlanta for the Olympics before starting work at Procter & Gamble full time in Cincinnati. . . . **Brad Brewer** just finished up Intermediate Naval Flight Officer training down in Pensacola, Fla., and has selected the E-2C Hawkeye as his aircraft. He's moving to Norfolk, Va., to complete the airborne early-warning syllabus and should have his wings by the beginning of November. His roommate, **Jeremy DeYoung**, is in pilot training and just did his first solo around mid-May. He claimed that it was his best flight yet. However, Brad says, "that is like claiming you got a hole-in-one golfing by yourself."

**Carrie Miller** just finished the first of two years in the master's of public policy program at the Kennedy School of Government at the Little Red Brick Schoolhouse. This summer she's working for **Lew Branscomb**, **Brian Kahin**, and **Charles Nesson** on the Information Infrastructure Project at Harvard. . . . **Annie Fortunato** is taking a yearlong leave of absence from Columbia graduate school to teach high school for a while on Long Island. She will be at Woodmere Academy. . . . **Keith Jackson** will be at Pratt and Whitney in North Haven, Conn., from June through December this year on his Leaders For Manufacturing internship. He'll return for classes in the spring and plans to graduate next June.

**Manoj Wunnava** is in Alabama and Texas this summer for various Air Force activities. He's attending George Washington Medical School and is in the Air Force medical service crops (reserve) as a second lieutenant. He expects to be back in D.C. in August with an intervening trip to Miami in the works. . . . **Ken Nollett** has a research job for the summer, although he hopes to finish his project and submit a paper in the next couple of weeks so he can spend the rest of the summer studying for the dreaded PhD candidacy exam. He got a visit from **Tom Bruno** and **Rich Damaso** over Memorial Day weekend. Rich, who is currently living and working in Cambridge and singing with the Tanglewood Festival Chorus, was on his way to Iowa to pick up his dog. . . . **Erin McCoy** also earned a spot in the Tanglewood chorus, and is currently working at the MIT Bursar's Office. . . . **Parren Dhalla** is happily playing in LA. She is halfway through an MS in Communication Systems at USC and is loving working for a living at TRW. She's playing lots of ball in Hermosa Beach and says life is good!

That does it for now. Note my address change below. I decided that my work address would be better for correspondence since it's more permanent than my apartment address right now. (I'm planning to move at the end of August.) Until next time!—**Ranjini Srikantiah**, secretary, 116 Huntington Ave., Floor 13, Boston, MA 02116; e-mail: <srikantiah@idx.com>



# CourseNews

## CIVIL AND ENVIRONMENTAL ENGINEERING

The following are among the 35 astronaut candidates who arrived at the Johnson Space Center on August 12 to begin a period of training and evaluation: USN Commander David M. Brown, '81, SM '84, a flight surgeon with the U.S. Naval Test Pilot School in Patuxent River, Md.; USAF Captain Edward M. Fincke, '89 (XII, XVI), an XF-2 flight test liaison at the Gifu Air Base in Japan; Michael J. Massimino, SM '88 (II, TPP), ME '90 (II), PhD '90 (II), an assistant professor in the School of Industrial and Systems Engineering at Georgia Institute of Technology; Heidemarie Stefanyshyn-Piper, '84 (II), SM '85 (II), an underwater ship husbandry project officer at Naval Sea Systems Command in Arlington, Va.; and Daniel M. Tani, '84 (II), SM '88 (II), the manager of Pegasus Launch Operations at Dulles, Va.-based Orbital Sciences Corp. Following one year of evaluation and training, the astronauts will receive technical assignments within the Astronaut Office to further prepare them for Shuttle flight assignments.

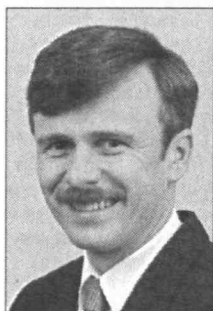


**Dennis McLaughlin**

He was a systems and consulting engineer with several companies from 1967 to 1975, and a principal with Resource Management Associates of Lafayette, Calif., from 1975 to 1983. He came to MIT as a lecturer in 1983 and was granted tenure in 1991. After five years of practicing control theory in the defense industry, he exported his systems expertise to the

Dennis B. McLaughlin was promoted from associate professor to full professor in the MIT Department of Civil and Environmental Engineering, effective July 1. McLaughlin received a BSEE degree (1966) from Purdue University and an MSE (1967) and PhD in hydrology (1985) from Princeton University.

water resource and environmental systems field. He has developed theory to solve hydrologic problems, particularly those related to contaminant transport in ground waters. . . .



**Joseph Zona**

failures. One of his areas of special interest is the engineering of structures to perform well during and after earthquakes; he is currently leading a seismic assessment of manufacturing facilities in Medellin, Colombia, for Procter & Gamble. Zona received a BS in civil engineering from Tufts University and an MBA from Northeastern University. He is a member of the American Society of Civil Engineers, the Boston Society of Civil Engineers Section, the American Concrete Institute, the American Institute of Steel Construction, and the Precast Prestressed Concrete Institute. As a member of



**Peter Nelson**

the seismic advisory committee to the Massachusetts State Board of Building Regulations and Standards, he is helping to develop new design provisions for the next edition of the state building code. SGH is a 135-person consulting structural engineering firm with offices in Arlington, Mass., and San Francisco, Calif. . . . Also from Simpson Gumpertz & Heger (SGH), Peter E. Nelson, SM '80, has been named principal. He joined SGH in 1975

Simpson Gumpertz & Heger (SGH), has named Joseph J. Zona, SM '76, a principal and appointed him to head its structural engineering division. Zona joined SGH in 1976 and has been actively involved in new building design, design of structural strengthening and retrofits, and investigation of structural

failures. One of his areas of special interest is the engineering of structures to perform well during and after earthquakes; he is currently leading a seismic assessment of manufacturing facilities in Medellin, Colombia, for Procter & Gamble. Zona received a BS in civil engineering from Tufts University and an MBA from Northeastern University. He is a member of the American Society of Civil Engineers, the Boston Society of Civil Engineers Section, the American Concrete Institute, the American Institute of Steel Construction, and the Precast Prestressed Concrete Institute. As a member of the seismic advisory committee to the Massachusetts State Board of Building Regulations and Standards, he is helping to develop new design provisions for the next edition of the state building code. SGH is a 135-person consulting structural engineering firm with offices in Arlington, Mass., and San Francisco,

and has been actively involved in investigations, renovations and remedial design for roofing, waterproofing, windows, and wall systems. He is currently principal-in-charge for ice dam and structural problems on a low-slope, wood-framed school in West Yellowstone, Mont.; moisture control for a processing plant clad with masonry and metal panels in New Bedford, Mass.; exterior insulation and finish system (EIFS) investigation in Quincy, Mass.; and investigation of a glass-fiber-reinforced concrete panel system in Revere, Mass. He received a BS in civil engineering from the University of New Hampshire. . . . John P. Wolf, SM '65, writes: "I co-wrote, with Chongmin Song, *Finite-element Modelling of Unbounded Media*, which has just been published by John Wiley & Sons.

Joseph F. Whittle, Jr., SM '74, reports: "I am now a branch manager of an environmental office of Professional Service Industries in Hillside, Ill., and provide senior technical support for projects nationwide." . . . Hart Crowser, Inc., one of the West Coast's leading environmental consulting and remediation design firms, has named Garry Horvitz, SM '75, to the corporation's board of directors. Horvitz is principal engineer in the firm's corporate headquarters in Seattle. With 20 years of engineering and management experience in geotechnical engineering, environmental investigation, and hazardous waste remediation projects, Horvitz is Hart Crowser's most senior principal engineer. He has been the lead engineer in many downtown Seattle commercial and industrial redevelopment projects including the Port of Seattle's Bell Street Pier and Wright Runstad's Central Waterfront development. He provided project management for the design and construction of Interstate 90, between I-5 and the Kingdome, including the transit lanes leading to Union Station. He is currently involved in the development of Southwest Harbor Island at Terminal 5 for the Port of Seattle. Horvitz is a member of the American Society of Civil Engineers (ASCE), the International Society of Soil Mechanics and Foundation Engineering, and the Society of American Military Engineers. He serves on the national steering committee for the Ports and Harbors Group of the ASCE. Horvitz graduated from SUNY/Bufalo.

### DEGREE CODES

AE	Aeronautical Engineer
BE	Building Engineer
CE	Civil Engineer
CHE	Chemical Engineer
CSE	Computer Science Engineer
DPH	Doctor of Public Health
EAA	Aeronautical & Astronautical Engineer
EE	Electrical Engineer
EGD	Doctor of Engineering

ENE	Environmental Engineer
MAA	Master in Architecture Advanced Studies
MAE	Materials Engineer
MAR	Master in Architecture
MCP	Master in City Planning
ME	Mechanical Engineer
MET	Meteorologist
MIE	Mineral Engineer
MME	Marine Mechanical Engineer
MNG	Master in Engineering

MPH	Master in Public Health
MTE	Metallurgical Engineer
NA	Naval Architect
NE	Naval Engineer
NUE	Nuclear Engineer
OCE	Ocean Engineer
PhD	Doctor in Philosophy
ScD	Doctor of Science
SE	Sanitary Engineer
SM	Master of Science

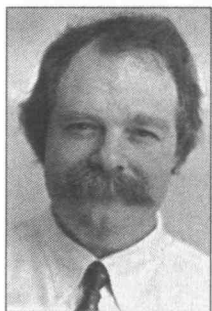


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# MECHANICAL ENGINEERING

The following are among the 35 astronaut candidates who arrived at the Johnson Space Center on August 12 to begin a period of training and evaluation: **Michael J. Massimino**, SM '88 (II, TPP), ME '90, PhD '90, an assistant professor in the School of Industrial and Systems Engineering at Georgia Institute of Technology; **Heidemarie Stefanyshyn-Piper**, '84, SM '85, an underwater ship husbandry project officer at Naval Sea Systems Command in Arlington, Va.; **Daniel M. Tani**, '84, SM '88, the manager of Pegasus Launch Operations at Dulles, Va.-based Orbital Sciences Corp.; USN Commander **David M. Brown**, '81 (I), SM '84 (I), a flight surgeon with the U.S. Naval Test Pilot School in Patuxent River, Md.; and USAF Captain **Edward M. Fincke**, '89 (XII, XVI), an XF-2 flight test liaison at the Gifu Air Base in Japan; Following one year of evaluation and training, the astronauts will receive technical assignments within the Astronaut Office to further prepare them for Shuttle flight assignments.



**Ian Hunter**

**Ian W. Hunter** and **Emanuel M. Sachs**, '76, SM '76, PhD '83, of the MIT Department of Mechanical Engineering were promoted from associate professor to full professor, effective July 1. Ian Hunter received his degrees from the University of Auckland in New Zealand—a BSc (1974), MSc (1975), DCP (1976), and PhD (1980). He was a post-doctoral fellow at McGill University from 1980 to 1983, a research fellow at McGill in 1984-85, and an assistant and associate professor from 1985 to 1994, when he came to MIT as an associate professor. At MIT, Hunter has become one of the major intellectual focal points of biomedical engineering research. He has developed a microsurgical robot for retinal surgery and an associated eye

system based on mechanical finite element models. He has contributed to an understanding of human joint dynamics and developed a variety of actuator technologies. Emanuel Sachs was a principal investigator with Arthur D. Little, Inc., from 1980 to 1985, and a consultant with Solarex Corp. in 1985-1986. He started teaching at MIT as a part-time lecturer in 1986 and received tenure in 1992. Sachs's expertise is in design and manufacturing. He is recognized internationally as one of the leading authorities in the field of rapid prototyping—an emerging and perhaps the fastest-growing area in

manufacturing. He has developed an important new manufacturing technique known as Three-Dimensional Printing, a process for manufacturing and tooling functional parts directly from computer models by adding layers of powder and selectively binding material in consecutive layers. He also is known for his seminal contributions in the area of VLSI fabrication process control as well as for his pioneering work on the growth of silicon for photovoltaics applications.



**Paul Croce**

Congratulations to **Paul A. Croce**, SM '64, who was elected VP of the research division of Factory Mutual Research Corp. (FMRC) in March. Croce began his career with Norwood, Mass.-based FMRC in 1972 as a senior research scientist and then as manager of the applied mechanics section. He rejoined FMRC again in 1991 after working for Arthur D. Little, Inc., for ten years, the last four as director of North America/South America Safety & Risk. He is a Fellow of the American Society for Mechanical Engineers and a member of the American Institute of Chemical Engineers. According to the press release, FMRC is a unit of Factory Mutual, the world leader in property-loss prevention. FMRC is owned by three major industrial and commercial property insurers: Allendale Insurance, Arkwright, and Protection Mutual Insurance.

An artificial skin developed more than 20 years ago by **Ioannis Yannas**, SM '59 (X-A), a professor of polymer science and engineering in the MIT Department of Mechanical Engineering, has finally been approved by the FDA and may one day replace most conventional grafts. It is the first artificial dermis to win government approval. The fake skin, called Integra, is formed by bonding collagen from animal tendons with molecules from animal cartilage. Surgeons implant the material, temporarily covered by a thin layer of silicone to protect against infection, as an alternative to conventional grafting. The material forms a temporary scaffold that eventually breaks down and dissolves, but not until the dermis, or inside layer of skin, begins to regenerate itself. In that way, it prevents the growth of ugly scar tissue under the epidermis or outer skin layer. Normally the dermis does not regenerate. The epidermis, which is able to regenerate itself, still must be taken from a graft from the back or other part of the patient's body, but a much thinner layer is needed than in a conventional graft. Yannas said he hopes the new skin eventually can be used on most burn patients after more experience is gained.

Captain **Robert B. Cook**, SM '77, OCE '77 (XIII), recently took over as program manager of the development of the Navy's newest Submarine Combat System, which recently was installed in the Seawolf-class fast-attack submarine. For the first time, the Navy has found a system that integrates combat control with sonar systems, resulting in greater versatility during exercises and operations. Cook's unit will use the new system to detect,

# CourseNews

classify, and track sonar contacts from other seagoing vessels, thereby programming such weapons as the Tomahawk Cruise Missile, harpoon missiles, and the MK-48 torpedo. Cook is responsible for the most complex software program in the Department of Defense, as well as the training, safety, and well-being of 20 employees. Cook was commissioned in 1972 through the Naval Academy in Annapolis, Md. Later, he attended Submarine School in Groton, Conn. Cook has served at a variety of places, from the fast-attack submarines USS *Sturgeon* and USS *Sea Devil* to the office of the Chief of Naval Operations. Cook's decorations include three meritorious service medals, three Navy-Marine Corps Commendation Medals, two Navy-Marine Corps Achievement Medals, and numerous service and campaign awards. . . . **Louis C. Kuttruff**, SM '47, writes briefly: "I retired from Exxon Chemicals." . . . **Frank W. Bowdish**, SM '43, reports: "At 78 years of age, I work part-time for Viatic Recovery Systems of Richland, Wash., where I am developing a new scheme for recovering and recycling waste pickle liquor."

# IV

## ARCHITECTURE

**Larry Vale**, SM '88, an associate professor in the MIT Department of Architecture, received a fellowship from the John Simon Guggenheim Memorial Foundation to continue his research on the development and redevelopment of American public housing. Guggenheim Fellows from all fields, according to the foundation, "are appointed on the basis of unusually distinguished achievement in the past and exceptional promise for future accomplishment." Of the 152 North American artists, scholars, and scientists awarded fellowships, Vale was one of only two assistant professors selected (he has since been promoted). His Guggenheim project, entitled "The Death and Life of American Public Housing," traces the controversial origins, disheartening decline, and ambitious redevelopment of three large public-housing projects in Boston, siting the 45-year "death and life" of these places in relation to evolving national ideas about how public housing should look and whom it should serve. . . .

**Paul Wang**, '91 (IV, XVI), MAR '95, MCP '95 (XI), and **Anthony Montalto**, MAR '95, won both a first and a third place prize in the "TransPavillon 94" design competition sponsored by Grace Construction Products. . . .

**Gregory P. Garvey**, SM '82, writes: "I am a professor in the Department of Design Art at Concordia University in Montreal. My interactive computer installation, *The Automatic Confession Machine (ACM)*—A Catholic Turing Test, was recently exhibited at the Light Factory in Charlotte, N.C., and in Lisbon, Portugal. ACM has been exhibited in Montreal, Minneapolis, Toronto, Boston, at SIGGRAPH '93 in Anaheim, Calif., and at SWISS Engineering in Montreux, Switzerland.



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land. It won the 1994 Digital Media Award for interactive work."

Anthony Flanagan, SM '91, MAR '91, writes: "I am director of development for Eden Housing, Inc., a housing development corporation." . . . Rad C. Acton, MAR '82, writes: "I practice architecture at Acton Architecture and Planning. I am the father of two, Anya and Owen."

James W. Partlow, MAR '73, writes: "I have recently gone into partnership with another MIT grad, Paul D. Hoag, MAR '83. Our firm's name is PDH Associates." . . . Mark E. Holzbach, SM '86 (MAS), SM '87, writes: "This year I started a new company called Group MAAX, Inc., with fellow MIT Media Lab alumnus Alejandro Ferdma, SM '86 (MAS). Our company is developing autostereoscopic 3-D imaging systems hardware and software."

Jonathan Goldman, SM '85, an environmental artist with the Boston-based Goldman Arts, was the mastermind behind *Blow Up!*, a series of environmental graphic projections onto the surface of the Copley Plaza Hotel during the May meeting of the Society for Environmental Graphic Design (SEGD). The 48x96-foot images focus on issues of freedom. Goldman contacted members of SEG D to solicit images representing the designers' interpretation of the significance, portrayal, or discussion of freedom. Goldman says: "We got some really wonderful, evocative images. The subject inspired a tremendous range of ideas from the designers—from a dramatic photograph of a Holocaust survivor's identification card to a crumpled parking ticket."

Serge Chermayeff, a retired architect and former head of the architecture departments at Harvard and Yale, died on May 8, 1996, at his home in Wellfleet, Mass., where he had lived for the last 55 years. He was 95. Chermayeff, born in the Caucasus, received his education in England, where he also did most of his early work. He was associated with a series of architectural firms and started the academic side of his career on the faculty of the European Mediterranean Academy in Cavalière, France, in the early 1930s. He came to the United States in 1939 and was in private practice while teaching at the San Francisco Art Institute and Brooklyn College, where he was chair of the Department of Design from 1942 to 1946. He was later on the faculty of the Illinois Institute of Technology and MIT. His association with Harvard started in 1953, as head of the Department of Architecture, a position he held for nine years. He filled the same post at Yale from 1962 until his retirement in 1970. Among his early work was the seaside Bexhill Pavilion in England, which was restored last year. In California, he designed the Clarence Mayhew House in Oakland and the elegant, wood-framed Horn house in Marin County. He was the author, with C. Alexander, of *Community and Privacy: Toward a New Architecture of Humanism* (Doubleday, 1963) and, with Alexander Tzonis, of *Shape of Community: Realization of Human Potential* (1971). He was a co-founder of the American Society of Planners and Architects. At the recommendation of Walter Gropius, he also served as president of the Chicago Institute of Design.

The Association of Alumni and Alumnae was notified that Michael John Blee, MAR

'59, a principal partner at Michael Blee Design Partnership in Sussex, England, died on February 18, 1996. No further information was provided.

## V CHEMISTRY

At the April dedication of its new National Center for Polymer Research, the University of Massachusetts awarded honorary degrees to Major Catherine G. (Cady) Coleman, '83, and MIT professor Walter H. Stockmayer, '35, PhD '40. Coleman was commissioned as a second lieutenant in the U.S. Air Force in 1983. She then entered the UMass doctoral program in polymer science and engineering, and was called into active duty in 1988 as a research chemist at the Materials Directorate of the Wright Laboratory, where she synthesized model compounds to investigate the use of organic polymers for third-order nonlinear optical applications. She completed a PhD in 1991 with her dissertation research focusing on polymer synthesis and polymer surface modification. Coleman was selected as an astronaut by NASA in 1992 and reported to the Johnson Space Center. As a volunteer test subject, she set several endurance and tolerance records in the centrifuge program at Armstrong Aeromedical Laboratory. Last fall she logged nearly 16 days in space as a mission specialist with a focus on materials science on the six-million-mile flight of Space Shuttle Columbia, completing 256 orbits of the earth. A world leader in the physical chemistry of macromolecules and a teacher for 57 years, Walter Stockmayer is the Albert W. Smith Professor of Chemistry Emeritus at Dartmouth College. As a distinguished visiting lecturer and frequent advisor to both students and faculty, he has nurtured many facets of the polymer science effort at UMass. A member of the National Academy of Sciences and the American Academy of Arts and Sciences, he holds several honorary degrees and has received awards including the National Medal of Science, Ford Prize for Polymer Physics, and Polymer Chemistry Award of the American Chemical Society. The international polymer community honored his 80th birthday in 1994 with a symposium at the American Chemical Society meeting in San Diego.



Bennett N. Epstein

Bennett N. Epstein, PhD '56, was awarded the Lavoisier Medal for Technical Achievement by DuPont. The honor was created by DuPont in 1990 to recognize scientists and engineers whose careers were marked by creative contributions that resulted in a measurable business impact or significant technical

achievement. Medalists are inducted into the Lavoisier Academy and memorialized by bronze plaques on permanent display at DuPont's experimental station. Epstein joined DuPont in 1946. His work helped open up met-



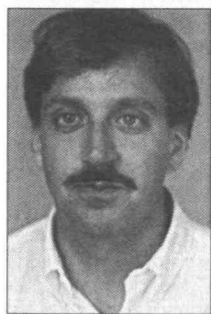
al replacement markets to engineering polymers, creating major new competitive arenas. Most notably, his research formed the basis of a new branch of material science—extremely tough semicrystalline thermoplastics. The best known of these are the supertough nylon molding resins, Zytel® ST, but his work also led to the development of Delrin® ST acetal resins, Rynite® SST polyester resin, and Bexloy® automotive engineering resins. He retired in 1987. He holds a BS and an MS in chemical engineering from Columbia University.

Melvyn M. Kassenoff, SM '66, of West Orange, N.J., writes: "I was recently promoted to executive director of Patent and Trademark Affairs at Sandoz Corp."

## VI ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

William J. Dally was promoted from associate professor to full professor in the MIT Department of Electrical Engineering & Computer Science, effective July 1. Dally received a BS (1980) from Virginia Polytechnic Institute, an MS (1981) from Stanford University, and a PhD (1986) from CalTech. He was appointed ITT Career Development Assistant Professor in 1986, and given tenure in 1992. Dally is regarded as one of the most influential computer architects of his generation. He is an iconoclastic researcher who enjoys challenging

conventional wisdom, looking for new ways of doing things rather than making incremental improvements. Yet despite his focus on a long-term research agenda, he has had significant impact not only on the research community but on industry as well. His research contributions range from novel digital-



William Dally

design techniques to new techniques for implementing high-level programming languages. The work for which he is most well known is the design of interconnection networks for massively parallel-processing machines. . . . Howard J. Wexler, SM '95, writes: "I am currently a senior electrical engineer for the Raytheon Co.'s electro-optics laboratory in Tewksbury, Mass. Last summer, I competed on the local Hunter-Pleasure horse show circuit with my horse, Red Rover."

Theodore Elliott Kupfrian, SM '65, of Bedford, Mass., an electronics engineer and one of the designers of the lunar excursion module, died on November 5, 1995, at Brigham and Women's Hospital after a two-year fight with cancer. He was 54. Born in Brooklyn, Kupfrian was raised in Binghamton, N.Y. He graduated in 1963 from Purdue University with a bachelor's degree, and received two master's degrees, one from MIT, the other in computer science from Lowell University. Kupfrian worked for RCA in Burlington from 1963 to 1983 in space-program engineering and space-flight computer simulation. He helped to design several key elements of the lunar module that was used in moon landings. He also

helped design electro-optics systems, a project that took him to Bangkok during the Vietnam War. During the 1980s, he was chief electrical engineer for Daymarc in Westford, Mass., designing equipment for high-speed testing of electronic components and integrated circuits. Most recently, he was chief consulting engineer for Laser Services of Waltham, where he designed control equipment. Kupfrian was a member of Triangle, an engineering fraternity, and both Tau Beta Pi and Eta Kappa Nu, national honor societies for engineers. He was also a member of the Society of Sigma Nu at MIT.

## VI-A INTERNSHIP PROGRAM

So many people over time have told me they turn to this column first. It's an inspiration to continue writing into my retirement.

Professor Markus Zahn, '67, SM '68, EE '69, ScD '70, is most helpful in keeping me up-to-date on how the Program is progressing. As I write this at the end of May, he tells me all students have met with their VI-A Company Advisors and he has joined many of these meetings. In the last issue I reported on the selection of a new VI-A class. VI-A still emphasizes the gains in associating with a company as part of a young engineer's educational process—something VI-A alums continually reiterate to me. One gains a perspective on what industry is like, how companies operate, and whether that is a line of work one is interested in early on—an advantage come graduation.

Two companies joining the Program this year are the American International Group of New York, N.Y., and SQA, Inc., of Burlington, Mass.

You've probably read a lot about "re-engineering" as it relates to MIT. The following departmental faculty are taking advantage of this year's special retirement incentive: Abraham Bers, SM '55, ScD '59; Fernando J. Corbató, PhD '56 (VIII); Alvin W. Drake, '57, EE '61, ScD '62; Shaoul Ezekiel, SM '64 (XVI), ScD '68 (XVI); Lawrence S. Frishkopf, PhD '56 (VIII); Robert G. Gallager, SM '57, ScD '60; Leonard A. Gould, '48, ScD '53; Hermann A. Haus, ScD '54; Alan L. McWhorter, ScD '55; Frederic R. Morgenthaler, '55, SM '56, PhD '60; and Richard D. Thornton, SM '54, ScD '57. We wish them well in their retirement and congratulate them for their many achievements! You may wish to write them yourselves.

This year Graduation coincided with Technology Day. Vice-President Al Gore was commencement speaker on a beautiful, warm, sunny Friday, June 7th. Visitors to the VI-A Office included Edward J. Bacon, '46, SM '47, whose father, incidentally, was a warm friend of my father's when I was a child in Wellesley; Shazia Makhdumi, '91, SM '92, who is graduating from Stanford and will be working for Netscape; and Philip O. Martel, '71, SM '72, chief engineer for SenTech, Inc., of Lexington, Mass. At the Stratton Student Center, I was hailed by Jay Goldman, '71, SM '73, of Wellesley, Mass., who was here for his 25th reunion.

Tech Day activities extended into Saturday and coming up for that was Holton E. Harris, '44, SM '48, of Westport, Conn. During a long telephone chat on Friday afternoon, we realized we were in the same Army Signal Ser-

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vice Battalion in World War II serving in the Philippines in General Douglas MacArthur's headquarters in Manila and Leyte respectively. Professor Robert H. Rediker, '47, PhD '50 (VIII) was in the same headquarters on Leyte when I was there, although we didn't know each other at the time. You can imagine what a telephonic reunion Holton and I had for this 50th anniversary of WWII and how sorry he was I wasn't going to be at MIT during his Saturday visit. Holton was a close friend of Professor Karl L. Wildes (as was I) who, for many years, was an assistant in the VI-A Office.

The Alumni/ae Office informs me that Ralph H. Thornton, '51, SM '52, retired from the Norden Systems Division of United Technologies in 1994, is "enjoying retirement."

I also had a pleasant visit at my home in Wellesley from Richard S. Grinnell, SM '93, SM '93, who's with PictureTel Corp., Danvers, Mass. He has been promoted to technology standards analyst in the marketing group. He showed me the color photos he had taken during a number of business trips to Europe.

The end of the Spring Term brings many awards to students for their academic achievements. Twenty-two VI-A's were elected to the national honorary engineering society Tau Beta Pi, out of 100 from the School of Engineering. Twenty-seven of sixty-four students taken into EECS's Eta Kappa Nu were VI-A's; several were selected for Phi Beta Kappa. Other VI-A students have received recognition for special achievements—all too numerous to mention individually as space in this section is to be focused mainly on VI-A alumni/ae.

The Department of Electrical Engineering and Computer Science held its annual awards and social function on May 19th at Boston's Museum of Science. Many of you have had contact with Marilyn A. Pierce when doing the graduate phase of VI-A. Marilyn received the Department's Richard J. Caloggero Award at that gathering for her long and devoted service in our Graduate Office.

A Course VI'r (although not a VI-A'r), with a significant achievement is that of William R. Brody, '65, SM '66, who has recently been elected president of Johns Hopkins University. Besides his MIT degrees, Bill received a PhD in EE and an MD from Stanford University. I knew him during his undergraduate days at MIT. A prestigious achievement—Congratulations Bill!—John A. Tucker, director (emeritus) and lecturer, VI-A Program, MIT, 77 Mass. Ave., Rm 38-473, Cambridge, MA 02139-4307; e-mail: <jat@fenchurch.mit.edu>.

## VII BIOLOGY

Russell L. Cuhel, PhD '81, writes: "I received permanent status in a 100 percent research appointment in March 1995. I got married on a University-National Oceanographic Laboratory System research vessel on an NSF-sponsored cruise to the Sargasso Sea during Hurricane



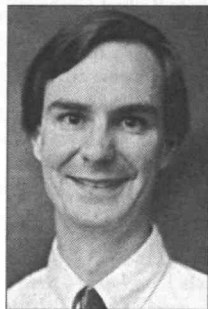
Marilyn on the autumnal equinox of September 22, 1995. The bride is Carmen Aguilar-Diaz of the Carnegie Institute of Washington, D.C. . . .

**Rudolf Jaenisch**, professor of biology and a member of the Whitehead Institute for Biomedical Research, is co-recipient of the Molecular Bio-analytic Prize from the Boehringer Mannheim Group in Germany. He shares the 1996 award with Mario Capecchi of the University of Utah. The two were cited for their "pioneering work in establishing transgenes as a basic tool for research in molecular biology and medicine." Jaenisch, a physician, received his prize on April 23 in Munich, Germany, where he presented a lecture on "DNA Methylation in Development and Cancer." He said: "I am pleased to be receiving this award. Transgenic science is an important research tool because it allows us to study gene function in the context of a whole animal. It allows us to make mutations in a gene and study how it affects the animal, so that if we know which gene is mutated in a particular human disease, we can develop mouse models with the same mutation." Today, mouse models of diseases such as epilepsy, colon cancer, hypertension, and diabetes are providing new insights into the genetic basis of these diseases. Previously, scientists had only cells in tissue culture to work with. Studies using tissue culture gave researchers valuable information about the function of genes and their role in disease, but often raised as many questions as they answered because disease is a function not of a single cell but of a whole organism. Jaenisch's breakthrough work with tumor viruses and mice in the 1970s demonstrated for the first time that it was possible to integrate foreign DNA into the DNA of early mouse embryos; mice derived from these embryos carried the foreign genes in all of their tissues. Subsequently, Jaenisch injected the leukemia virus into early mouse embryos and showed that the DNA sequence of the leukemia virus had integrated into a specific location in the mouse DNAs, and that this trait was passed on. These mice were the first transgenic animals in history. The mice came down with leukemia, showing that the genetically transmitted viral gene caused the disease. In the years since, these techniques have been further developed in Jaenisch's laboratory and in other labs worldwide. Of particular importance is the technology of gene targeting by recombination. Today, all these technologies are commonly used to generate transgenic models of human disease. Such models allow scientists to understand the complex interplay of genetics, age, diet, hormone levels and other factors that affect the onset of diseases such as cancer and heart disease. Most recently, Jaenisch has been focusing on a process called DNA methylation, which helps regulate the switching on and off of genes. Current projects in his lab are also shedding new light on the development of colon cancer, neurological disorders, connective tissue disorders, and developmental abnormalities in muscle and bone.

## VIII PHYSICS

Edmund Bertschinger, Mehran Kardar, PhD '83, and John L. Tonry of the MIT Department of Physics were promoted from associate professor to full professor, effective July 1. Edmund

Bertschinger received a BS (1979) from the California Institute of Technology and a PhD (1984) from Princeton University. He was a research associate at the University of Virginia from 1983 to 1985, and a research fellow at UC/Berkeley from 1985 to 1986, at which time he became an assistant professor at MIT. He was the Class of 1956 Career Development Professor from 1990 to 1992,



**Edmund Bertschinger**

at which time he received tenure. An outstanding theoretical astrophysicist and a leader in the study of cosmology, Bertschinger's major accomplishments deal with understanding the large-scale structure of the universe. He and a colleague have developed a method that recovers the three-dimensional velocity and mass fields of the local universe using the observations of one-dimensional (radial) Doppler velocities and distances of galaxies. His contributions to cosmology include his analytic, self-similar treatment of the growth of voids in the



**Mehran Kardar**

expanding universe. Mehran Kardar received a BA (1979) from Cambridge University in England. From 1983 to 1986, he was a junior fellow in the Harvard Society of Fellows and a summer visiting research collaborator at Brookhaven National Laboratories. He became an assistant professor at MIT in 1986, and was the Class of 1948 Career Development Professor from 1990 to 1992. He was a visiting professor at Katholieke Universiteit (Belgium) in 1989, a visiting research collaborator at the IBM Research Laboratories in 1990, and a visiting professor at Oxford University in 1994. A leading theoretical physicist, Kardar's research has focused on the statistical mechanics and dynamics of surfaces, membranes, and interfaces. His work centers around problems in statistical mechanics in



**John Tonry**

which fluctuations and scaling behavior arise from either nonlinearities or randomness. John Tonry received an AB (1975) from Princeton and both an MA (1976) and a PhD (1980) from Harvard. He was a member of the Institute for Advanced Study from 1980 to 1982, and a Bantrell Research Fellow at CalTech from 1982 to 1985. He became an assistant professor at MIT in 1985 and an associate professor in 1990. Widely known for his work in astronomy and astrophysics, and

for his ability to find new solutions to complex problems, Tonry's major accomplishment is the development and application of a new method of measuring extra-galactic distances. Although the extra-galactic distance scale is the single most important quantity in cosmology, its value has remained uncertain to a factor of two for several decades. Tonry's method is to compare the apparent fluctuations in the surface brightness of galaxies. These arise from statistical fluctuations in the numbers of bright stars per unit solid angle, and so are proportional to the relative distances of the galaxies.

**Vera Kistiakowsky**, MIT professor emerita of physics, was elected to the first group of Fellows of the Association for Women in Science (AWIS). Kistiakowsky has served as president of AWIS, an organization with more than 60 chapters around the country.

The Acoustical Society of America has presented its 1996 Gold Medal to Ira Dyer, '49, SM '51, PhD '54, the Weber-Shaughness Professor of Ocean Engineering at MIT, "for contributions to ocean acoustics, structural acoustics, and aeroacoustics and for service to the Society." In a tribute accompanying the award, Arthur B. Baggeroer, SM '65 (VI), EE '65 (VI), ScD '68 (VI), of the Department of Ocean Engineering and Peter Mikhalevsky, PhD '79 (XIII), of Science Application International, Inc., a former MIT faculty member, wrote that Dyer's research has had a "profound impact" on acoustics over a career spanning nearly five decades. His research focused on the statistics of ambient noise, they wrote, especially as related to distant shipping, leading to fundamental new insight on the nature of acoustic fluctuations in the ocean. In 1975, Dyer launched a program, still in existence, which has studied reverberation, propagation, and ambient noise in the Arctic. In the meantime, he has become the leading expert on ambient-noise mechanics. "Whereas others gathered and summarized data, he explored the fundamental mechanisms of the noise and its coupling to the ocean," the tribute said. "In the last few years," it continued, Dyer "has led MIT's efforts in structural acoustics. . . . He and his students are now making seminal contributions on the backscattering and radiating by complex objects as well as new methods for their control." After his graduate study, Dyer joined Bolt, Beranek and Newman, Inc., where he remained until 1971, when he became head of what was then the Department of Naval Architecture and Marine Engineering and director of Sea Grant at MIT. "He soon led the department into new areas in ocean engineering which emphasized learning about the ocean environment," Baggeroer and Mikhalevsky wrote. "The character of the department was changed profoundly and its new name and status . . . is now known worldwide. At the same time, under Ira's leadership as director . . . the Sea Grant program, which was created to stimulate research and the wise use of the oceans, became a model, often emulated." The tribute also praised Dyer's teaching, commenting that he developed a graduate program in ocean acoustics and also nurtured several new subjects in that field, especially in conjunction with the MIT-Woods Hole Joint Program. It adds that Dyer is known as "a consummate lecturer with a clarity that makes it all but impossible not to learn in his class." Dyer has served the Acous-



tical Society of America as president, VP, and executive council member. Previous Gold Medal winners included three former faculty members, the late **Philip M. Morse** in 1973, **Leo L. Beranek** in 1975, and **Richard H. Bolt** in 1979.

The Association of Alumni and Alumnae was notified that **Walter Joseph Mordarski**, '49, of Wallingford, Conn., died on November 16, 1995. He was a scientist with Combustion Engineering, Inc., in Windsor, Conn. No further information was provided. . . . The Association of Alumni and Alumnae was notified that **Melvin Leslie Jackson**, SM '40, of West Redding, Conn., died on October 19, 1994. No further information was provided.

## X

### CHEMICAL ENGINEERING

**C. Judson King**, SM '58, ScD '60, was appointed provost and senior VP for academic affairs at the University of California. King had been interim provost and senior VP since August 1995. A chemical engineer whose work has been widely recognized, King joined UC in 1994 as vice-provost for research. He previously had served for 31 years at the Berkeley campus—as a professor, vice-chair, and chair of the Department of Chemical Engineering, dean of the College of Chemistry, and, finally, provost of professional schools and colleges. He has been associated with the Lawrence Berkeley National Laboratory as a senior scientist for more than 30 years. King came to the Berkeley campus in 1963 as an assistant professor after four years in a similar position at MIT. He graduated from Yale University in 1956 with a bachelor's degree in chemical engineering. King's numerous honors and memberships include the Warren K. Lewis Award from the American Institute of Chemical Engineers and membership in the National Academy of Engineering. He is a fellow of the American Institute of Chemical Engineers and the American Association for the Advancement of Science. King is the author of more than 200 journal articles and chapters in books.

**Robert Langer**, ScD '74, a chemical engineer at MIT, is on the scientific advisory board of Advanced Tissue Sciences, a biotechnology company in La Jolla, Calif. The company is developing two engineered-skin products. In a 1984 intellectual partnership between Langer and Joseph Vacanti, a surgeon at Harvard Medical School, the pair developed replaceable skin. Langer recalls: "My idea was to take degradable polymers, make scaffolds out of them, and grow cells on them. The idea was that if we made the scaffolds the right way, the cells would be able to reorganize themselves and make new tissues. The scaffold polymers would then degrade and disappear, leaving behind only new tissue." The skin is being used on a limited basis in hospitals across the United States.

## XI

### URBAN STUDIES AND PLANNING

**Joe Savitzky**, MCP '58, writes: "I've been quite busy with free-lance work since retiring from my long career with the Town Planning

Department of Jerusalem Municipality. Dvora and I do manage to visit the United States at least once a year, especially since both daughters (and one granddaughter) are there. I would love to show any old classmates around here in Jerusalem. It's a fascinating, if occasionally worrisome, place." . . . **Shampa Chanda**, MCP '89, writes: "For the last three years, I have been working on transportation-related issues in the New York City Department of City Planning. As a project director, I am updating the city's zoning resolution's parking requirements." . . . **Gary Hack**, professor of urban design at MIT, was elected a Fellow of the Urban Land Institute in 1995. . . . **Gail Kendall**, MCP '79, works for the Albany Institute of History and Art, where she handles budgeting, museum security, buildings and grounds, and accounting and coordinates renovation and new construction efforts. She was recently elected treasurer of the Gallery Association of New York State. . . . **Alan Sager**, PhD '79, teaches health policy analysis and planning at the Boston University School of Public Health. He writes, "I am still pursuing state-level health reform. Health remains the soft underbelly of inequality in the USA." . . . **J. Mark Schuster**, PhD '79, teaches the quantitative reasoning course to all entering MCP students at DUSP. He is also extremely active in various DUSP and Institute committees. . . . **Tim Campbell**, PhD '80, works at the World Bank in Washington, D.C., helping to transform the International Bank for Reconstruction and Development to work in the post-cold-war economic and political environment by identifying and disseminating best practices relating to local public choice and finance. . . . **Rebecca Black**, MCP '81, is busy helping the countries of Eastern Europe for the U.S. Agency for International Development. Projects include a new housing program in Croatia and transitional economic programs in Poland and Albania. . . . **Mary Akylas**, MCP '81, helps plan and implement strategic communications for the New England Electric System in Westboro, Mass. She has been busy trying to explain that utility's plan for reorganizing itself and the rest of the New England utility industry to regulators, opinion leaders, and the public. Part of her job is to explain testimony that **Paul Levy**, '74 (XI, XIV), MCP '74, has written on NEES's behalf. . . . **Victorio Hoskins**, MCP '81, was appointed in July 1995 to the position of assistant secretary of marketing for the State of Maryland. He leads a team of professionals "to reposition Maryland in the national and international economic development marketplace." Among other things, he oversees trade offices in Europe, Japan, and Taiwan. . . . **Sharon Lee**, MAR '81, MCP '81, is executive director of the Low-Income Housing Institute, a Seattle nonprofit agency. . . . **Arne Abramson**, MCP '82, is employed by Obayashi Hawaii Corp., a development firm in Honolulu. . . . **Amy Berger**, MCP '82, abandoned the city planning field 10 years ago. She is an industry analyst doing research reports on the telecommunications industry for Dataquest in San Jose. . . . **Anita Landecker**, MCP '82, manages community-based development strategies for the Local Initiative Support Corp., a non-profit agency in Los Angeles. She has served as chair of the Los Angeles board of directors of the Federal

# CourseNews

Reserve Bank. . . . **Vinay Shah**, SM '82 (IV), MCP '82, teaches architecture and urban design in Ahmedabad, India. . . . **Jeffrey Davison**, MCP '83, is a partner at Triad Investors Corp., a venture capital investment company in Newark, N.J. The firm recently completed an 18-month, \$15 million fundraising effort for a new venture capital limited partnership. The fund, now totaling \$25 million, focuses on investing in early stage technology companies in the Mid-Atlantic region. . . . **Claire Grossman**, MCP '83, does strategic planning at Ogilvy and Mather, working with clients to position their products and services in a way that is meaningful to their consumers. She says she has a greater appreciation of the power of "brand" image, and that it no longer just applies to products. "Image is based on many things and it affects profitability and performance." . . . **Gregory L. Polk**, MCP '83, lives in Folsom, Calif., and works for a government agency, which is involved in real estate development. . . . **Rochelle Bates Lee**, MCP '84, works at the Local Initiatives Support Corp. in Providence, R.I., where she assists community development corporations to develop affordable housing by providing predevelopment help, loans, and equity financing, technical assistance, and staff and board training. She expresses grave concerns over the current direction of federal policy, noting that they "will have a devastating impact upon the affordable housing industry and the revitalization of low- and moderate-income neighborhoods." . . . **Ed Shoucair**, MCP '84, is VP and partner at the Planners Collaborative in Boston. He works on a variety of economic development, transportation, and environmental planning topics, as well as public participation. . . . **David M. Weiss**, MCP '84, works on business finance issues at the Oregon Economic Development Department in Salem. . . . **Barbara Fields**, MCP '85, works on community development and real estate planning at the Local Initiatives Support Corp., a non-profit agency in Providence, R.I. . . . **Richard Kazis**, MCP '85, is VP for policy and research at Jobs for the Future, a non-profit agency in Boston. . . . **Cristina Nelson**, MCP '85, is a graduate student at the University of North Carolina/Chapel Hill working on a PhD in women's history, specifically on the Americanization of immigrant girls and women. She congratulates DUSP on recruiting **Aixa Cintron** to our faculty. . . . **Debra Wong**, MCP '85, is a project manager at Seattle's Department of Parks and Recreation. She manages about \$3 million in metro-funded mitigation plans resulting from the construction of the West Point secondary treatment plant. Many of her projects involve substantial volunteer and community involvement. . . . **Kelly Quinn Popejoy**, MCP '86, oversees long-range facilities planning for the Massachusetts court system in the state's Division of Capital Planning and Operations, which was a subsidiary of DUSP while **Tunney Lee** was its commissioner. Popejoy was promoted to director of her unit last February and is coordinating or directing



# GAZETTE

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roughly \$900 million worth of facilities development. . . . **Andrew M. Sachs**, MCP '86, works at the Dispute Settlement Center in Carrboro, N.C., a non-profit agency that provides mediation, training, and consulting in public-issues dispute resolution. He has a three-year appointment at UNC/Chapel Hill in the psychology department, where he is teaching undergraduates about non-violent conflict resolution. Also, he has been involved for eight years with Public Disputes Program, a community-based mediation service for local governments, non-profits, citizen and civic groups, and local businesses. . . . **Ellen Tohn**, MCP '86, lives in Chevy Chase, Md., and consults to non-profit organizations working on childhood lead-poisoning issues. She is involved in the National Center for Lead-Safe Housing in its technical assistance and research efforts to eliminate lead paint poisoning. . . . **Shih-Liang Tu** is an environmental specialist for the Asian Development Bank and has to travel a lot through Asia to review and evaluate infrastructure and urban development projects. . . . **Bruce Ehrlich**, MCP '87, is manager of the City of Boston's Supportive Housing Unit. He is responsible for coordinating housing development, rental assistance, and social service programs for the homeless and people with AIDS. During the past two years, his unit has helped develop and finance more than 450 units of housing. . . . **Roger Herzog**, MCP '87, is a project manager for affordable housing developments for the Cambridge (Mass.) community development department. He played a lead role for the city in helping move forward a new housing development on the MIT-owned land known as University Park. This 77-unit mixed-income rental project is one of the largest multi-family rental projects to be developed in the last 20 years in the city. . . . **Angela D. McCormick**, MCP '87, lives in Boulder, Colo., where she has been the director for design, development, and preservation in the city's planning department since February 1995. She worked with PADCO last year to help organize the first land auction in Ukraine. . . . **Mihir Bhatt**, MCP '87, directs the Foundation for Public Interest in India. . . . **Hideo Obitsu**, MCP '87, is manager of the project planning department at Obayashi Corp. in Tokyo. . . . **Eswaran Selvarajah**, SM '87, runs his own business, SCHEMA, in Brighton, Mass., and works on issues of community development in minority areas. . . . **Scott Cassel**, MCP '88, is director of waste policy for the Massachusetts Executive Office of Environmental Affairs. He has been using consensus-based processes to solve some thorny environmental issues, including reviewing plans to dredge Boston Harbor, developing waste-oil-collection legislation, and solving disputes between bottle redemption centers and bottle distributors. Before that, Cassel helped **Paul Levy**, '74 (XI, XIV), MCP '74, clean up Boston Harbor. Scott joined DUSP this year for a student career night, helping our first- and second-year students plan their next steps. . . . **Yok-Shiu Lee**, PhD '88, teaches in the Department of Sociology at the Chinese University of Hong Kong. . . . **Jolene Ostler**, MCP '89, works in the City of Phoenix Planning Department and also teaches a course in urban transportation planning at Arizona State University. A current project is to devel-

op a new ethic for development in the Sonoran Desert ecosystem. . . . **Charlotte Fleetwood**, MCP '90, performs environmental analysis in support of Parsons Brinckerhoff's work on the Boston Central Artery/Third Harbor Tunnel project. She credits DUSP's quantitative reasoning and GIS courses with helping and also gives a nod to **Allen Adelman**, MCP '90, for the good wastewater advice he provided in his thesis. She has become an expert on rodent control: "We're doing a good job!" . . . **Karen Levine**, MCP '90, works at Cambridge Systematics, where she consults to public and private interests on transportation and regional planning issues.

**Debra Northrop Nissen**, MCP '90, is manager of environmental restoration and waste management at the Sandia National Laboratory in Livermore, Calif. She finds that her planning degree helps her work more easily with engineers and researchers, as they collaborate to find solutions to a number of problems. . . . **Daniel Acosta**, MCP '91, is a principal at the Acosta Agency, a development and consulting firm in San Francisco. . . . **Gilberto E. Chona**, MCP '91, works at the Inter-American Development Bank as an economist and economic policy analyst, reviewing issues in much of Central America, Paraguay, Trinidad, and Tobago. . . . **Kristin Dawkins** is director of research for the Center on Trade and Environment at the non-profit Institute for Agriculture and Trade Policy in Minneapolis. . . . **R. Steven Konkell**, PhD '91, is principal investigator at Konkell and Co. in Kennewick, Wash., where he works on projects for governmental agencies and private sector firms. He had two stints at DOE national laboratories and then turned to private practice. . .

**Paul Lambert**, MCP '91, has a small consulting firm, Lambert Advisory, which focuses on real estate development and helps public agencies leverage private-sector money for public use. . . . **Eric Novak**, MCP '91, is a project manager at Tise, Hurwitz & Diamond, in Brookline, Mass., where he is currently overseeing a comprehensive public-housing planning and development project in New York. He previously spent four years with the non-profit Technical Development Corp. in Boston. . . . **Renee Okamura**, MCP '91, administers a new fellowship program at the Nonprofit Housing Association of Northern California in San Francisco to train people of color in nonprofit housing development. . . . **Marybeth Shaw**, MCP '91, is director of archives, publications, and exhibits at Richard Meier & Partners, Architects, in New York City.

**Julie Chen**, MCP '92, works with Catholic Relief Services. She notes, "I'm the boss in a small office in Skopje, Macedonia, and I have the last say on how to allocate our resources in Macedonia." She expresses some surprise at her sudden promotion to country representative after only two years with CRS. . . . **Dora Leong Gallo**, MCP '92, is a project specialist at the Culver City (Calif.) Redevelopment Agency, after spending two years as an aide to L.A. City Councillor Mark Ridley-Thomas. She is enjoying the change from policy-making to implementation. . . . **Jeffrey B. Litwak**, MCP '92, is working for the U.S. Attorney General's office in Portland, Ore. He decided to attend law school after two years in a very controversial regional planning agency.



**Jacob Park**, MCP '93, is in Tokyo at the U.N. University Institute of Advanced Studies, where he researches the environmental and urban development activities of the United Nations. . . . **Alexander P. Gamota**, MCP '94, recently accepted a year-long Hub Project Manager position with PADCO, Inc. in the Russian Federation, working on a U.S.-funded enterprise land-privatization project. He is responsible for managing and overseeing seven project cities, and is kept company on his travels by his new wife. Gamota was the land auction advisor for the first land auction in Ukraine, which sold private ownership rights, and co-wrote *A Guidebook to Land Auctions in Ukraine*.

**Caroline Kim**, MCP '94, works for the mayor of Los Angeles, performing research on specific industries and doing outreach to business associations and firms. She is implementing some new initiatives in the apparel and printing industries in the city. . . . **Rodolfo (Rudy) Mata**, MCP '94, is clerk in the Massachusetts Land Court, researching and writing legal memoranda.

**Kimberly Tallbear**, MCP '94, works at JK Research Associates, in Beverly, Mass., helping to make sure that American Indian tribes are appropriately involved in the DOE policy-making processes. She also helps public agencies to respect the government-to-government relationship that exists between the federal government and tribal governments.

**Jo-Shing Yang**, MCP '94, works at a non-profit, government-funded management consulting firm call Stockton Minority Business Development Center, in San Francisco. . . . **Beverly Byer Gallo**, SM '95, MCP '95, is director of development at South Boston Community Housing and is finding the transition from private-sector architecture and development to non-profit, community-based initiatives an interesting move. One project is the creation of an electric-vehicle manufacturing center. This was even before General Motors announced its plan to enter the market. . . . **Michael Gray**, MCP '95, is a planner in the urban planning group of VHB in Watertown, Mass. . . . **Jennifer Hyde**, MCP '95, is doing research at Harvard on industrial ecology and consulting on recycling issues.

**Karen Kho**, MCP '95, is a policy analyst working on national transportation issues for the U.S. Department of Transportation. She is in the Presidential Management Intern Program.

**Jacques Sandberg**, MCP '95, manages a portfolio of affordable apartment developments at the National Equity Fund in Chicago. . . . **Cheryl Taylor**, MCP '95, writes and carries out research at Shorebank Advisory Services, a Chicago consulting firm. She finds that she is actually using many things that she learned at MIT.

**Paul Wang**, '91 (IV, XVI), MAR '95 (IV), MCP '95, and Anthony Montalto, MAR '95 (IV), won both a first and a third place prize in the "TransPavilion 94" design competition sponsored by Grace Construction Products.

## XII EARTH, ATMOSPHERIC AND PLANETARY SCIENCES

**John P. Grotzinger** and **Daniel H. Rothman** were promoted from associate professor to full professor in the MIT Department of Earth, Atmospheric, & Planetary Sciences,

effective July 1. Grotzinger received a BS (1979) from Hobart College, an MS (1981) from the University of Montana, and a PhD (1985) from Virginia Polytechnic Institute. He was a postdoctoral fellow at Lamont-Doherty from 1985 to 1986 and a research scientist with the Geological Survey of Canada in 1986. He became an assistant professor at MIT in 1988, and received tenure in 1992. Grotzinger's research is in the areas of sedimentation, stratigraphy, and tectonics. He is especially interested in using the stratigraphic record to understand the large-scale processes that operated during the early history of the earth. He and a colleague have undertaken a major survey of rapid periods of evolutionary change and mass extinctions that have demonstrated that the "Cambrian explosion" of life was compressed into a far shorter interval than previously thought. Daniel Rothman received an AB degree (1979) from Brown University and a PhD (1986) from Stanford University. He was a visiting assistant professor at MIT in 1986, became an assistant professor that same year, and received tenure in 1991. In 1992-93,



**Daniel Rothman**

he held visiting appointments at the University of Chicago and the École Normale Supérieure in Paris. Rothman is best known for his fundamental work on discrete lattice-gas models of fluid dynamics, including multiphase flow, hydrodynamic interfaces, flow-through porous media, and hydrodynamic

aspects of phase transitions. Recent contributions include physical models of scale invariance in geological problems related to the formation of sedimentary rocks. The following are among the 35 astronaut candidates who arrived at the Johnson Space Center on August 12 to begin a period of training and evaluation: USAF Captain **Edward M. Fincke**, '89 (XII, XVI), an XF-2 flight test liaison at the Gifu Air Base in Japan; USN Commander **David M. Brown**, '81 (I), SM '84 (I), a flight surgeon with the U.S. Naval Test Pilot School in Patuxent River, Md.; **Michael J. Massimino**, SM '88 (II, TPP), ME '90 (II), PhD '90 (II), an assistant professor in the School of Industrial and Systems Engineering at Georgia Institute of Technology; **Heidemarie Stefanyshyn-Piper**, '84 (II), SM '85 (II), an underwater ship husbandry project officer at Naval Sea Systems Command in Arlington, Va.; and **Daniel M. Tani**, '84 (II), SM '88 (II), the manager of Pegasus Launch Operations at Dulles, Va.-based Orbital Sciences Corp. Following one year of evaluation and training, the astronauts will receive technical assignments within the Astronaut Office to further prepare them for Shuttle flight assignments.

In April, the Museum of Science in Boston awarded the Walker Prize, which recognizes "meritorious published scientific investigation and discovery," to **Mario J. Molina**, professor of atmospheric chemistry and chemistry at MIT. Molina was honored for his

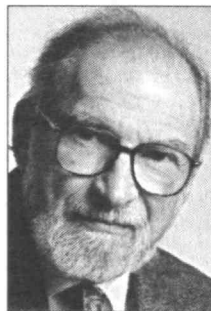
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leadership role in developing a scientific understanding of ozone depletion. . . . **Albert M. Bottoms**, SM '62, writes: "I am the Ellis A. Johnson Chair of Mine Warfare at the Naval Postgraduate School in Monterey, Calif. I am organizing a symposium entitled "Technology and the Mine Problem" to be held November 18-22 at the school."

The Association of Alumni and Alumnae was notified that **Pun Lien Koh**, ScD '39, of Lubbock, Tex., died on December 6, 1994, and **Robert A. Jensen**, '94, of Daytona Beach, Fla., died on August 17, 1995. No further information was provided.

## XIII

### OCEAN ENGINEERING



**Ira Dyer**

The Acoustical Society of America has presented its 1996 Gold Medal to **Ira Dyer**, '49 (VIII), SM '51 (VIII), PhD '54 (VIII), the Weber-Shaughness Professor of Ocean Engineering at MIT, "for contributions to ocean acoustics, structural acoustics, and aeroacoustics and for service to the Society." In a tribute

accompanying the award, **Arthur B. Baggeroer**, SM '65 (VI), EE '65 (VI), ScD '68 (VI), of the MIT Department of Ocean Engineering and **Peter Mikhalevsky**, PhD '79, of Science Application International, Inc., a former MIT faculty member, wrote that Dyer's research has had a "profound impact" on acoustics over a career spanning nearly five decades. His research focused on the statistics of ambient noise, they wrote, especially as related to distant shipping, leading to fundamental new insight on the nature of acoustic fluctuations in the ocean. In 1975, Dyer launched a program, still in existence, which has studied reverberation, propagation, and ambient noise in the Arctic. In the meantime, he has become the leading expert on ambient noise mechanics. "Whereas others gathered and summarized data, he explored the fundamental mechanisms of the noise and its coupling to the ocean," the tribute said. "In the last few years," it continued, Dyer "has led MIT's efforts in structural acoustics. . . . He and his students are now making seminal contributions on the backscattering and radiating by complex objects as well as new methods for their control." After his graduate study, Dyer joined Bolt, Beranek and Newman, Inc., where he remained until 1971, when he became head of what was then the Department of Naval Architecture and Marine Engineering and director of Sea Grant at MIT. "He soon led the department into new areas in ocean engineering that emphasized learning about the ocean environment," Baggeroer and



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Mikhalevsky wrote. "The character of the department was changed profoundly and its new name and status. . . is now known worldwide. At the same time, under Ira's leadership as director . . . the Sea Grant program, which was created to stimulate research and the wise use of the oceans, became a model, often emulated." The tribute also praised Dyer's teaching, commenting that he developed a graduate program in ocean acoustics and also nurtured several new subjects in that field, especially in conjunction with the MIT-Woods Hole Joint Program. It adds that Dyer is known as "a consummate lecturer with a clarity that makes it all but impossible not to learn in his class." Dyer has served the Acoustical Society of America as president, VP, and executive council member. Previous Gold Medal winners included three former faculty members, the late Philip M. Morse in 1973, Leo L. Beranek in 1975, and Richard H. Bolt in 1979.

Congratulations to Pabitra Mukerji, SM '80, who writes: "I have been promoted to head of the naval architecture department at the corporate headquarters of McDermott International, Inc., in New Orleans. McDermott is the world's largest offshore contractor and my department is responsible for engineering and R&D activities of McDermott's worldwide fleet of offshore vessels/ships. My department also performs engineering for offshore oil and gas platform design and installation and provides technical support to McDermott Shipbuilding, Inc. After seven years of overseas assignments with McDermott in Europe (U.K., Belgium, and Holland), Australia, and Southeast Asia, I was glad to come home. Now I have settled here in New Orleans for the last four years. However, I do have to travel overseas three or four times a year. I was in Boston in October 1995 on business after a five-year absence. It was great to visit the department again. It brought back a lot of memories." . . . Captain Robert B. Cook, SM '77, OCE '77 (XIII), recently took over as program manager of the development of the Navy's newest Submarine Combat System, which recently was installed in the Seawolf-class fast-attack submarine. For the first time, the Navy has found a system that integrates combat control with sonar systems, resulting in greater versatility during exercises and operations. Cook's unit will use the new system to detect, classify, and track sonar contacts from other seagoing vessels, thereby programming such weapons as the Tomahawk Cruise Missile, harpoon missiles, and the MK-48 torpedo. Cook is responsible for the most complex software program in the Department of Defense, as well as the training, safety, and well-being of 20 employees. Cook was commissioned in 1972 through the Naval Academy in Annapolis, Md. Later, he attended Submarine School in Groton, Conn. Cook has served at a variety of places, from the fast-attack submarines USS *Sturgeon* and USS *Sea Devil* to the office of the chief of naval operations. Cook's decorations include three meritorious service medals, three Navy-Marine Corps Commendation Medals, two Navy-Marine Corps Achievement Medals, and numerous service and campaign awards. . . . William C. Gibson, Sr., '51 NC, writes: "I am still doing some work in the following areas: horse

farm, spouse, children, grandchildren, Lions Club, yacht surveys as Riggs Marine, geopolitical letters, USS *Morris* (DD417) vets of WWII. Having served in the Navy from 1938 to 1964 and worked in defense until 1985, you can understand my interest in hearing Al Little, '46, (XVI) when he spoke to the MIT Delaware Valley group in media earlier this year. What a great privilege to hear his story, "Corona—the Weapon that Killed Nobody and Won the Cold War." What a thrill it must be for those associated with the project to finally go public after all these years."

## XIV ECONOMICS

Alan S. Blinder, PhD '71, vice-chairman of the Federal Reserve Board and the Gordon S. Rentschler Memorial Professor of Economics at Princeton University, was elected a member of the American Philosophical Society (APS). Founded by Benjamin Franklin in 1743, APS is the oldest and most prestigious learned society in the United States devoted to the advancement of scientific and scholarly inquiry. Early members included George Washington, Thomas Jefferson, Thomas Paine, and John Marshall. Today, APS has 723 elected members. Since 1901, 226 members have received the Nobel Prize. APS organizes its members into five classes; Blinder is in the social sciences division. . . . The University of Chicago Press recently published *The Microstructure of Foreign Exchange Markets* by Jeffrey A. Frankel, PhD '78, Giampaolo Galli, and Alberto Giovannini.

## XV MANAGEMENT

Robert C. Salipante, SM '81, currently senior VP of strategic marketing and technology at ReliaStar Financial Group, has been chosen to head the individual insurance operations of Northwestern National Life Insurance Co., a ReliaStar subsidiary. In addition, he will continue to head the company's technology function. Salipante joined the company in 1992 as senior VP and CFO, and assumed the position of senior VP for strategic marketing and technology in 1994. Previously, Salipante spent 14 years with Cleveland-based Ameritrust Corp., where he held a number of senior management positions, including executive VP for the banking services group. He is a graduate of the University of Michigan. Founded in 1885, ReliaStar Financial Corp. is a Minneapolis-based holding company that provides financial security through individual life insurance and annuities, employee benefits, reinsurance, retirement plans, and mutual funds.

Mano H. Chinnaswamy, SM '92, writes: "I have joined Johnson & Johnson as the business unit manager of their medical division. My wife, Jane, our two daughters, Nicaela and Elly, and I have relocated from Jacksonville, Fla., to Simsbury, Conn. I am now within driving distance of home and Cambridge. It's good to be back. I love snow, but last winter has surpassed even my limit."



... **Enrico Perotti**, PhD '90, was nominated associate professor of international financial markets with tenure at the University of Amsterdam. He previously was at the Boston University Graduate School of Management and the financial market group at the London School of Economics. He writes: "I love being in Amsterdam. In Europe, there is now an excellent research network in corporate finance and international finance. I am doing much consultant work for the World Bank, the IMF, and European financial institutions on emerging capital markets. We are also starting a master's degree in international finance and a research network on emerging market finance."

**Michelle Wolpert**, SM '91, of Houston, writes: "I now work at Enron Corp. as a manager." ... The Information Technology Services Marketing Association (ITSMA) announced that **Julie A. Schwartz**, SM '90, has been appointed VP for research. In this newly created position, Schwartz is responsible for the research and publishing of all ITSMA services marketing-related studies. Schwartz's activities include continuing to furnish corporate members with practice-case studies that provide an in-depth understanding of how various service companies deal with marketing complexities. Prior to joining ITSMA, Schwartz was a senior analyst with the State Street Research and Management Co., a director of professional services research for Dataquest, and a manager of research for the Ledgeway Group. She has written numerous articles and spoken at numerous industry conferences. Schwartz has a BS from the University of Pennsylvania. She is married and has three children. ... Via e-mail, **Margaret Konner**, SM '93, writes: "I recently moved to Portland, Ore., to have a more balanced lifestyle and to be near my family. I am currently involved in several freelance consulting projects, exploring a start-up opportunity, and pursuing writing projects. Not too many Sloan alums here—call me if you come to Portland!"

The Association of Alumni and Alumnae was notified that **John Clark Collins**, SM '42, of Medford Ore., died on November 26, 1995. He was president of the Ashland Lumber Co. in Ashland, Ore. No further information was provided.

## SLOAN FELLOWS

AT&T announced the appointment of **Shaun P. Gilmore**, SM '89, to the newly created position of president of the company's northeast region. Gilmore assumes overall responsibility for AT&T operations in seven northeastern states, and will be based in New York. AT&T's global as well as northeast region headquarters. Gilmore was most recently VP for global consumer communications services, with responsibility for managing AT&T's global consumer long-distance business. He began his AT&T career in 1980 after earning an MBA in finance from Harvard University. He has held a variety of management positions in marketing and sales, human resources, strategy development, product marketing, and business planning. ... **F. Duane Ackerman**, SM '78, was named CEO and president of BellSouth Corp. Previously, he was the company's vice-chair and COO. He began his 31-year career with

BellSouth and its predecessor companies after graduating from Rollins College. He has held a number of operational and staff responsibilities throughout the company including VP and higher positions in marketing, planning, technology operations, and finance with BellSouth and its major subsidiaries. ... **James F. McNulty**, SM '85, was named CEO of the Parsons Corp. He joined the corporation in 1988 and has held several senior-level positions, including senior VP and manager of the Ralph M. Parsons Co.'s systems division, which oversaw the company's aviation, government, infrastructure, and commercial markets. McNulty most recently served as president of Parsons Infrastructure & Technology Group, Inc., one of four global business units of the Parsons Corp. He has more than 25 years of experience in technical direction, management, and implementation of large engineering, construction, and R&D programs. McNulty earned a BS in engineering from the U.S. Military Academy and an MS in nuclear physics from Ohio State University. ... **Advanta Corp.** has appointed **Dana Becker Dunn**, SM '84, to the company's board of directors. She is currently VP for multimedia market offers at Lucent Technologies (formerly AT&T's systems and technology unit). At Lucent Technologies, Becker Dunn oversees the product and service market management for a business unit of 25,000 associates that develops, manufactures, markets, and services advanced communications and multimedia systems for business and government customers in more than 90 countries worldwide. She began her AT&T career in 1972 at Bell Laboratories, advancing through a variety of managerial positions in AT&T Information Systems, AT&T Consumer Communications Services, and ultimately, Lucent Technologies. Becker Dunn earned a BS in mathematics from Southern Illinois University and an MS in computer science from Northwestern University. ... Also at Lucent Technologies, **Francis McGinnis**, SM '83, has been appointed managing director of the company's European microelectronics business. McGinnis started with AT&T in Chicago in 1965. He joined the microelectronics company as a sales VP in 1989 and managed departments in engineering, human resources, and customer services. ... **Donald L. Runkle**, SM '76, VP and general manager of Delphi Saginaw Steering Systems since 1993, was named a GM VP and general manager of Delphi Energy & Engine Management Systems in Flint, Mich. Runkle began his GM career in 1968 at Chevrolet Engineering in Detroit. He has held several positions including chief design engineer at Chevrolet, assistant chief engineer at the Buick motor division, chief engineer at Chevrolet, and director of advanced vehicle engineering for the former Chevrolet-Pontiac-GM of Canada Group. He was elected a GM VP in charge of the former Advanced Engineering Staff in 1988. He was appointed VP in charge of the North American Operations Engineering Center in 1992. He earned bachelor (1968) and master of science (1971) degrees in mechanical engineering from the University of Michigan. ... **Peter Fenner**, SM '75, a former president and corporate officer of AT&T Transmission Systems, a \$3 billion-business unit, has joined Com21, Inc., as president and CEO. Fenner, who has been a

# CourseNews

member of Com21's advisory board, also joins the company's board of directors. Com21 is developing an integrated cable modem for data and telephony communications delivered over the cable TV network. Fenner has over 30 years of telecommunications industry experience with AT&T holding various senior management positions within the company. Fenner has a BS in industrial engineering from Lehigh University. ... Boeing president **Philip M. Condit**, SM '75, assumed additional duties of CEO on April 29. Condit has served as president and a member of the Boeing board since 1992. Previously he was an executive VP of the Boeing commercial airplane group and general manager of Boeing's 777 division. Condit, the seventh person to lead the company in its 80-year history, has held major management assignments in engineering, production, sales, and marketing within Boeing commercial airplane group. He began his career in 1965 as an aerodynamics engineer on the supersonic transport (SST) program. He is most closely associated with the 777 airplane program, which he headed from its inception in 1989 until he became company president. He also played a leading role in the development of the 757 program, where from 1978 to 1984 he held positions as chief project engineer, director of 757 engineering, and VP of the division.

Eastman Chemical Co. has named **Darryl K. Williams**, SM '90, senior VP for technology management. Williams joined Eastman in 1965 as a chemical engineer and was transferred in 1974 to Carolina Eastman Division in Columbia, S.C., where he served as polyester manufacturing superintendent. He returned in 1986 to Kingsport, where his assignments included superintendent of the polymer chemicals division, and general manager of the polyester plastics packaging business. Williams joined Eastman Kodak Co. in 1990 as manager of strategic planning for consumer color film. He returned to Eastman Chemical Co. in 1992 as president of Eastman Chemical Japan Ltd. in Tokyo and became VP for Asia Pacific regional support services in 1993 and VP for Asia Pacific sales in 1994. A native of Maryville, Tenn., Williams received a BS in chemical engineering from Vanderbilt University in 1964 and an MS in the same field from the University of Tennessee in 1965. He and his wife, Karen, are the parents of two sons.

Eastman Chemical Co. has appointed **Garland S. "Buddy" Williamson**, SM '92, president of its Longview, Tex.-division. Williamson has been responsible for selecting company plant sites in Asia. Born in Homer, La., Williamson received a chemical engineering degree from Louisiana Polytechnic Institute in 1967. After graduation, he joined the Eastman Chemical Co. as a chemical engineer. He moved to chemical manufacturing operations in 1977, where he held positions as department superintendent and division superintendent before being promoted to director of the olefin plastics business teams in 1987. In 1990, he was named assistant to the president of Eastman Chemical Co. ...

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—ESTABLISHED IN 1978—

Jan E. Hopland, SM '84, has joined Symmetrix, a Lexington, Mass.-management consulting firm that integrates information technology (IT) management and business redesign. Symmetrix helps clients to incorporate new management concepts and technologies in a practical way to achieve quick, measurable results. Hopland's responsibilities include sales and development of Symmetrix' IT capabilities and the identification of alliance partners. Prior to Symmetrix, Hopland directed the IT strategy and architecture consulting practice for Digital Equipment Corp. Hopland also directed strategy and planning for Digital's internal IT organization, introducing new services and renewing the infrastructure, building the basis for process and applications re-engineering to client-server, while drastically reducing the staff and cost of Digital's IT function. Hopland originated the Virtual Organization concept. He works with practitioners and academics worldwide to develop modern business and IT management approaches. He holds an MBA from the University of St. Gallen (Switzerland). . . . Tory Tory DesLauriers & Binnington has appointed **Stephen O. Marshall, SM '91**, as managing partner of the firm's European office in London. Marshall has been with the firm since 1982, practicing business law degree with a focus on corporate finance and mergers & acquisitions. He has a bachelor of laws degree from the University of Western Ontario. Tory Tory DesLauriers & Binnington is a Toronto-based business law firm with over 200 lawyers. The firm provides legal services to Canadian and international clients.

**Philip George Eckert, SM '53**, of Lake Wylie, S.C., died on January 21, 1996. He was retired from the Illinois Bell Telephone Co. A native of Rock Island, Ill., Eckert received his undergraduate education at the University of Illinois. He served as a first lieutenant in the Navy during WWII in the Pacific Theatre. He retired after 38 years from Illinois Bell Telephone as an assistant VP. He was a member of the Economics Club of Chicago.

The Association of Alumni and Alumnae was notified that **Robert Leonard Rhodes, SM '54**, of Saint Paul, Minn., died on February 4, 1995. He was retired from Northwest Airlines. No further information was available.

### XV-E SLOAN EXECUTIVES

Cooper Tire & Rubber Co. announced the election of **Deborah M. Fretz, '88**, senior VP for logistics at Sun Company, Inc., to its board of directors. Fretz joined Sun Co., the largest independent U.S. petroleum refiner-marketer, in 1977, and has served in a variety of management positions including president of Sun Pipe Line Co. and Sun Marine Terminals, which transport and store crude oil and refined petroleum products. Named senior VP for logistics in 1994, she is currently responsible for all Sun Co. transportation-related businesses, including pipelines, terminalling, trucking, rail, and marine. Fretz is a director of GATX Corp. She received a BS degree in biology/chemistry from Butler University and an MBA in finance from Temple University.

The Association of Alumni and Alumnae was notified that **Alden W. Kilborn, '58**, of Palm Desert, Calif., died on June 19, 1994. He was retired from the Southern Pacific Transportation Co. No further information was provided.

## MASTER OF TECHNOLOGY

Vijay Varma, SM '95, and his wife, Madhu, are happy to report the birth of their son, Rahul Varma, on May 12, 1996. . . . **Alejandro Ruclaus, SM '95**, is coordinating the design of a new concentration (Management of Technology) in the MBA program at Monterrey Tech University in Mexico. Alejandro says there is a great demand for this type of program in Mexico and "as usual, MIT was a clear innovator creating the MOT 15 years ago!"

## XVI AERONAUTICS AND ASTRONAUTICS

The following are among the 35 astronaut candidates who arrived at the Johnson Space Center on August 12 to begin a period of training and evaluation: USAF Captain **Edward M. Fincke, '89 (XII, XVI)**, an XF-2 flight test liaison at the Gifu Air Base in Japan; USN Commander **David M. Brown, '81 (I), SM '84 (I)**, a flight surgeon with the U.S. Naval Test Pilot School in Patuxent River, Md.; **Michael J. Massimino, SM '88 (II, TPP), ME '90 (II), PhD '90 (II)**, an assistant professor in the School of Industrial and Systems Engineering at Georgia Institute of Technology; **Heidemarie Stefanyshyn-Piper, '84 (II), SM '85 (II)**, an underwater ship husbandry project officer at Naval Sea Systems Command in Arlington, Va.; and **Daniel M. Tani, '84 (II), SM '88 (II)**, the manager of Pegasus Launch Operations at Dulles, Va.-based Orbital Sciences Corp. Following one year of evaluation and training, the astronauts will receive technical assignments within the Astronaut Office to further prepare them for Shuttle flight assignments.

## XVII POLITICAL SCIENCE

The Association of Alumni and Alumnae was notified that **Vernard A. Lanphier, '76**, of Washington, D.C., died on March 13, 1993. He was president of Berner Lanphier & Associates, Inc. No further information was provided.

## XVIII MATHEMATICS

**Kathryn Lesh, PhD '88**, was recently promoted to associate professor of mathematics at the University of Toledo (Ohio). She received a BA from Swarthmore College in 1983. . . . The Office of Naval Research has recognized **Lenore Cowen, PhD '93**, with a Young Investigator Program award. The Hopkins faculty member was one of only 34 recipients this year, chosen from a nationwide field of 416 applicants. The three-year grant will provide \$90,000 annually, primarily for graduate students to assist Cowen in her research. Cowen, an assistant professor of mathematical sciences at Johns Hopkins University, knows little about statistics; her expertise is in other areas of math. But some researchers believe this handicap may help Cowen succeed where others have failed in their efforts to crack a



complex problem called "the Curse of Dimensionality." The curse occurs when a statistician is working with data in a sufficiently high-dimensional space that it becomes impossible to make reliable predictions from the data. But Cowen, using her expertise in combinatorics—the mathematics of finite objects and combinations of objects—believes she can sometimes sneak around the curse and pull useful information from problems that usually stump statisticians. Cowen, 28, joined the Hopkins faculty in 1994. She completed her undergraduate studies at Yale, which she entered at 16.

## XXIV LINGUISTICS AND PHILOSOPHY



Alec Marantz

Alec Marantz was promoted from associate professor to full professor, effective July 1. He was a National Science Foundation Fellow from 1978 to 1981, a junior fellow in the Society of Fellows at Harvard from 1981 to 1984, and an assistant professor at the University of North Carolina/Chapel Hill from

1984 to 1990, when he came to MIT as a tenured associate professor. Marantz is regarded as one of the most influential linguists of his generation. The emergence of the important and lively subfield of morpho-syntax is largely his creation. As an example of the breadth and depth of his intellectual interests, he recently broadened his research agenda to include cognitive neuroscience, where his goal is the unification of linguistics and brain science.

George Boolos, PhD '66 (XXI), professor of linguistics and philosophy at MIT and president of the Association for Symbolic Logic, died on May 27 at his home in Cambridge, Mass., at the age of 55. The cause of death was cancer of the pancreas. A prominent logician and philosopher, Boolos was internationally known as one of the originators of provability logic. He was also a leading authority on the work of the 19th century German mathematician and philosopher Gottlob Frege, widely regarded as the founder of modern logic. Boolos's work contributed to an important and ongoing reevaluation of the significance of Frege's philosophical and technical achievements, especially his attempt to show that the basic laws of arithmetic are themselves principles of logic. Boolos had been awarded a Guggenheim Fellowship for 1996 to complete a book on Frege, and he had been recently appointed Rockefeller Professor of Philosophy at MIT. He was the author of *The Logic of Provability* and, with Richard C. Jeffrey, *Computability and Logic*, one of the most widely used textbooks in intermediate logic. He was also an expert on puzzles of all kinds, ranging from crossword puzzles to Rubik's Cube. In 1993, he qualified for the London Regional Final of the London

Times crossword-puzzle competition, where his score was one of the highest recorded by an American. Born in New York City, Boolos graduated from Princeton in 1961 with a bachelor's degree in mathematics. As a Fulbright Scholar, he attended Oxford where he earned a B.Phil. in 1963. He also holds the first PhD in philosophy ever awarded at MIT. He taught at Columbia University for three years before returning to MIT in 1969. Contributions to the George Boolos Memorial Scholarship Fund can be sent to the Department of Linguistics and Philosophy, MIT, Cambridge, Mass., 02139.

## TPP TECHNOLOGY AND POLICY PROGRAM

Fabienne and Jean-Bernard Caen, SM '81, are pleased to announce that their sons, Timothee and Barthelemy, were joined by another brother, Tomas, on May 3. . . . Francois Jacques, SM '85 (TPP, XV), is serving on the executive board of Lafarge Aluminates, where he is the executive VP for strategy, development, and technology. With 650 employees and plants worldwide, Lafarge Aluminates is the specialty cements unit of Lafarge. Jacques is responsible for expanding the business in developing countries and introducing new products. Jennifer and Jeff Dieffenbach, SM '89 (TPP, III), announce the birth of their second son, Michael, on April 16. He joins their older son, Zachary.

Burt Monroe, SM '90, will be venturing to Cambridge next year to accept a postdoctoral fellow with the Harvard/MIT Research Training Group in Positive Political Economy. .

James Moses, SM '91 (TPP, II), was promoted to manager at Electrical Computer-Aided Design (ECAD), Tools, and Methods. He has been traveling frequently to Ottawa and the Boston area. He has also begun supporting Northern Telecom initiatives in France and the United Kingdom, and made his first trips to Paris and London last year. . . . Andrew Parris, SM '93 (TPP, II), is now Dr. Parris! He passed his defense on April 25, 1996, and was in Russia this summer. . . . Kristine Cornils, SM '94 (TPP, I), is working at ICF Kaiser Engineers, primarily handling a project supporting strategic planning for DOE's waste-management program. . . . Marguerite and Henri Poupart-Lafarge, SM '94, are pleased to welcome their first child, Tanquy, who was born in November 1995. . . . Abby, Jesse, and John Weiss, SM '94, are proud to announce the arrival of Hallie on May 10, 1996.

Andrew Cap, SM '95 (TPP, XVII), will begin a seven-year MD/PhD program at the Boston University Medical School in September. . . . Tyson Browning, SM '96, and Mort Webster, SM '96, will be staying on at MIT for a PhD in Technology, Management, and Policy. . . . Nils Fonstad, SM '96, will begin a PhD program at Sloan School of Management in September. .

Yongwon Kwon, SM '96, has accepted a position as deputy director of the Ministry of Trade and Industry in Korea.—Richard de Neufville, TPP, MIT Room E40-252, Cambridge, MA 02139; e-mail: <tp@mit.edu>

# CourseNews

## STS PROGRAM IN SCIENCE, TECHNOLOGY & SOCIETY

Dean Philip S. Khoury of the MIT School of Humanities and Social Science announced the appointment of Michael M.J. Fischer as director of the Program in Science, Technology, and Society, effective July. Fischer will succeed Merritt Roe Smith, who has been program director since 1992. In making the appointment, Khoury said that Fischer "enjoys a major international reputation as a teacher and scholar with a deep commitment to interdisciplinary education and research." Fischer, a professor of anthropology and science and technical studies, is a distinguished anthropologist well known for his many contributions to the cultural studies of science and to Middle Eastern studies, as well as for a seminal theoretical work, *Anthropology as Cultural Critique* (1986, with George Marcus). He joined the MIT faculty in 1993, having previously been the director of the Center for Cultural Studies at Rice University. Fischer received a BA (1967) in liberal arts/anthropology from the Johns Hopkins University, and a MA (1969) and PhD (1973) in anthropology from the University of Chicago.

## Deceased

The following deaths have been reported to the Alumni/ae Association since the *Review* last went to press:

Francis Anton Weiskittel, '19; December 9, 1994; Baltimore, Md.  
David Grelick, '23, SM '24; February 3, 1996; Lehigh Acres, Fla.  
Philip Charlesworth Smith, '23, SM '24; March 15, 1996; Melvin Village, N.H.  
David Lasser, '24; May 5, 1996; San Diego, Calif.  
George Te-Chih Wang, '24, SM '25; April 29, 1996; Port Washington, N.Y.  
Harry E. Thomas, SM '25; April 22, 1996; Grosse Pointe, Mich.  
Millard Marquis Greer, '26; April 4, 1996; North Palm Beach, Fla.  
Clifton Benedict McFarland, '26; January 30, 1996; Camden, S.C.  
Kenneth Pratt Morse, '26; October 1, 1995; Dayton, Ohio  
Charles Edmund Poore, '26; January 23, 1994; Winter Park, Fla.  
Theodore S. Bogardus, '27; February 22, 1995; Cleveland, Ohio  
Roger Lovett Nowland, '27; November 29, 1995; E. Blue Hill, Maine  
Joseph Siguard Yates, '27; May 30, 1996; Bartlesville, Okla.  
Theodore Davos Money, '28; May 1, 1994; Berkeley, Calif.  
Carl Henry Rumpel, '28, SM '29; February 21, 1995; Longwood, Fla.  
Eugene Chen Koo, '29; ScD '32; 1968  
Everett Pine Weatherly, '29; October 3, 1995; Kansas City, Mo.  
William Francis R. Griffith, Jr., '30, SM '31;

June 17, 1995; Tucson, Ariz.  
**Dwight Horton**, '30; March 8, 1994  
**Edward Balch Hubbard**, '31; April 11, 1996;  
 Weston, Mass.  
**Joseph Barnett Paul**, '32; May 13, 1996;  
 Washington, D.C.  
**Thomas Francis Galvin**, '33; April 11, 1996;  
 Stoneham, Mass.  
**Charles Keller**, '33; April 10, 1996; New  
 Orleans, La.  
**Bryce Telford Lyall**, '33; February 28, 1996;  
 Houston, Tex.  
**Alf Hugo Bendixen**, SM '34; January 21,  
 1995; Gainesville, Fla.  
**Herbert John Hiemenz**, SM '34; May 14,  
 1994; Newport News, Va.  
**Theodore Otto John Kresser**, '34; January 12,  
 1996; Orange, Tex.  
**John Delong Moomaw**, '34; July 1, 1995;  
 Ridgefield, Conn.  
**Zay Blanchard Curtis**, '35; May 13, 1996;  
 Ponte Vedra, Fla.  
**Willard Marcy**, '37, PhD '49; August 8, 1994;  
 Santa Fe, N.Mex.  
**Robbins Horton Ritter**, '37; July 15, 1988;  
 Roseland, La.  
**Frederick Joseph Hurley**, '38; September 21,  
 1995; Fairfax, Va.  
**Harlan Turner**, '38; February 19, 1996;  
 Asheville, N.C.  
**Charles Mosher Wheeler**, '38, SM '39;  
 December 15, 1995; Erie, Pa.  
**George Richard Blake**, '39, SM '40; August 2,  
 1995; Pittsburgh, Pa.  
**Gail Homer Schade Swan**, '39; November 25,  
 1995; Dallas, Tex.  
**Ernest Trowbridge Gregory**, '40; November  
 23, 1995; Alamo, Calif.

**George Cameron Seay**, SM '40; September  
 1992; Sarasota, Fla.  
**Francis Lee Shackelford**, SM '40; March 29,  
 1995; New York, N.Y.  
**Alfred Bercry Booth**, '41; February 1, 1996;  
 Westport, Conn.  
**Paul Estey Carlson**, '41; November 16, 1995;  
 Needham Heights, Mass.  
**David Simpson McNally**, '41; May 13, 1996;  
 San Antonio, Tex.  
**Lawrence Christian Biedenharn**, '44, PhD '49;  
 February 12, 1996; Austin, Tex.  
**Vigdor William Kavalier**, '45; January 17,  
 1996; Pittsburgh, Pa.  
**Frederick Walter Furland**, USN, '48; May 7,  
 1996; San Diego, Calif.  
**William Edward Helfrich**, SM '48; December  
 3, 1995; Glastonbury, Conn.  
**Stuart Frank Svedeman**, '49; December 25,  
 1995; Los Altos, Calif.  
**Lester Joseph Grant**, '50; June 2, 1993;  
 Bedford, N.H.  
**William Armstrong Price**, '50; January 21,  
 1996; Logo Vista, Tex.  
**Robert Stanley Bryan**, MCP '51; April 16,  
 1996; Fairfield, Conn.  
**Cornelis van Mook**, '51; August 16, 1995;  
 Glenshaw, Pa.  
**Benjamin Agusta**, '52; October 30, 1994;  
 Durham, N.C.  
**Eugene Lee Amazon**, '52; July 28, 1995;  
 Geneva, Switzerland  
**Edward Adrian Mayne**, '52; April 12, 1996;  
 Guildford, England  
**James Ronald Jones**, SM '53; August 16,  
 1995; South Easton, Mass.  
**Richard Maxwell Horowitz**, MAR '55;  
 October 22, 1995; Moorestown, N.J.

**John Michael Duich**, SM '58; April 17, 1996  
**John Herbert Wood**, PhD '58; March 23,  
 1996; Los Alamos, N.M.  
**Michael John Blee**, MAR '59; February 18,  
 1996; Lewes, Sussex, England  
**Alexander Sandor Borsanyi**, '59; October 16,  
 1995; Newport Beach, Calif.  
**Cuthbert C. Hurd**, '59; May 22, 1996; Portola  
 Valley, Calif.  
**David Roger Ludwig**, '59; December 15,  
 1995; Windham, N.H.  
**Ellwood Dennis Johnson**, '62; April 1, 1996;  
 Hartselle, Ala.  
**Daniel Earl Thornhill**, '62, SM '63, EE '65;  
 November 19, 1995; Arlington, Mass.  
**Joseph Sherman Jones**, PhD '63; April 8,  
 1996; Macungie, Pa.  
**Stephen Markstein**, '63; January 26, 1996;  
 New York, N.Y.  
**Joel Carl Speare**, '67, SM '68; April 22, 1996;  
 Lexington, Mass.  
**Robert Edward Donovan**, SM '68; April 3,  
 1996; Fairfield, Conn.  
**Adrian Akmajian**, PhD '70; July 27, 1983;  
 Tucson, Ariz.  
**John Eckles Crawford**, SM '76; November 30,  
 1995; Jackson, Miss.  
**James Duane Palmer**, SM '78; July 2, 1990;  
 Bloomington, Ill.  
**Soumaila Doumbia**, SM '80; 1996; Ivory  
 Coast, Africa  
**Craig Duncan Douglas**, ScD '83; May 13,  
 1996; Lexington, Mass.  
**John Benjamin Carter, Jr.**, '85; April 1, 1996;  
 San Francisco, Calif.  
**Walter J. Murphy**, '87; April 3, 1996;  
 Fanwood, N.J.  
**Robert A. Jensen**, '94; August 17, 1995



## HERE MIGHT A NAME BEST LIVE?



The name of a deceased MIT alumna or alumnus can be linked to the Institute through gifts made by classmates, colleagues and family. Memorial gifts can be unrestricted or directed toward scholarships, research or any program of the Institute. The Institute notifies bereaved families of the name of each donor, and each gift becomes a part of MIT's permanent record.

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# PuzzleCorner

This next academic year will be unusual for me. For the first time since 1963, when I went off to MIT as an undergraduate, I will not be primarily at a university. Instead, I will be on leave from NYU in order to spend the year at NEC research. My NYU e-mail and U.S. mail addresses will still work, but you can also reach me at <gottlieb@research.nj.nec.com> and NEC Research Institute, 4 Independence Way, Princeton NJ 08540.

## Problems

A/S 1. On a recent visit to the bridge club, Larry Kells took his seat kibitzing at his customary table and heard the following auction:

S	W	N	E
1D	2D	3D	4D
5D	6D	7D	Dbl*
P	P	P	

\*After having found out he could not bid 8D!

Looking at the hands afterwards, it was clear that every bid was reasonable, and the contract was the best that could be reached if both sides bid optimally. Can you reconstruct the deal?

A/S 2. George Blondin wants to know the smallest integer whose product when multiplied by 9 is the original number with the rightmost digit rotated all the way to the left.

$abc \dots lmn$

9

$nabc \dots lm$

The use of the letters from a to n was just for convenience and the fact that n is the 14th letter does not imply that the answer has 14 digits.

A/S 3. Leonard Nissim is a fan of nine-digit numbers that contain each of the nine positive digits exactly once

(there are nine factorial such numbers). How many of these numbers are divisible by 11?

## Speed Department

Jon Sass has some more quickies where each capital letter represents a word beginning with that letter. For example, the answer to the first problem below is 16 ounces in a pound.

16 O in a P  
90 D in a R A  
1 W on a U  
5 D in a Z C  
11 P on a F T  
1,000 W that a P is W  
29 D in F in a L Y  
64 S on a C  
40 D and N of the G F

## Solutions

Apr 1. We start with a bridge problem from Doug Van Patter:

North	
♠	K J 10 4
♥	K Q 6 5 2
♦	A Q 8
♣	4
South	
♠	A Q 9 3
♥	7 4
♦	7
♣	A K Q 9 7 6

South dealt and the bidding went as follows with East-West silent: 1C 1S 4NT 5D 6S. What is South's best line of play?

The following solution is from Thomas Hariman.

The toughest opening lead is a diamond. Since finessing for the king would present a 50 percent chance of being set immediately on the obvious return lead of a heart, dummy must play the ace. Anticipating a 4-1 trump split, lead the spade 3 to the ace and then lead a small heart toward the king.

If West has the ace but holds off, the king wins. The spade king exposes the bad trump split, but the club ace followed by a club ruff high should set up the clubs: pull trump and run clubs for 12 tricks.

If West grabs the ace and leads a diamond to force declarer to ruff, a small heart to the king followed by a heart ruff high establishes the 12th trick: pull trump, take the heart queen, then three top clubs.

When East holds the heart ace, best defense is to take the king and lead a diamond to force

a ruff. Declarer leads to the heart queen, next ruffs a heart high, and pulls trump. If hearts broke 3-3, dummy leads two good hearts and declarer takes the rest with high clubs. Otherwise he plays top clubs to win if they break 3-3. This should win about 2/3 of the time.

If the first trump lead shows a 5-0 split, declarer survives with some distributional luck. Again lead a low heart: if the holder of the ace is void of trump and declarer can guess the distribution, he can take topplers and cross-ruff, opponents' five spaces falling under higher ones.

The danger in not pulling trump right away is of course a heart ruff when the ace is opposite a singleton, about a 1/6 chance (even less: if West had a singleton, he would love to lead it). But a 4-1 trump split probability is about twice that.

Apr 2. Ermanno Signorelli wonders if there is a right triangle with integer sides such that both legs are odd integers.

Robert Barnes shows us that no such triangle exists.

Supposing that there is a right triangle with all sides integers, the legs being odd, this gives:

$$(2m+1)^2 + (2n+1)^2 = r^2, \text{ so} \\ (4m^2+4m+1) + (4n^2+4n+1) = r^2, \text{ so} \\ 4(m^2+n^2) + 4(m+n) + 2 = r^2.$$

LHS is obviously even, so RHS is even; since  $r^2$  is even, so is  $r$ .

$$4(m^2+n^2) + 4(m+n) + 2 = (2k)^2 = 4k^2, \text{ so} \\ 2(m^2+n^2) + 2(m+n) + 1 = 2k^2.$$

But now LHS is odd, and RHS is even.

Hence, there is no such triangle.

Apr 3. An illuminating question from Chuck Livingston

Lamp posts are to be installed on the equator of a perfectly spherical planet in such a way that they illuminate the entire equator. A few very tall lamps could be used—three is the minimum—or many short lamps. In what way should this be done so that the total height of the posts is as small as possible.

Mike Gennert notes that infinitely many infinitesimally small lamps can bring the total height down to zero.

Let the planet have radius 1. If there are  $N$  lamps, each lamp must illuminate  $2\pi/N$  of the equator. A right triangle going from the lamp to the center of the earth to the edge of the region illuminated by that lamp has hypotenuse  $1+H$ , where  $H$  is the lamp post height, and angle  $\pi/N$  at the center of the earth. Therefore  $(1+H)\cos(\pi/N) = 1$  so  $H = (\cos(\pi/N))^{-1} - 1$ . The total height of all lamp posts is just  $T = NH$ .  $T$  is a monotonically decreasing function of  $N$ , approaching zero (using l'Hôpital's rule) as  $N$  goes to infinity. This can be checked by computing the derivative of  $T$  w.r.t.  $N$ .

$$\frac{dT}{dN} = \frac{1}{\cos(\pi/N)} - 1 - \frac{\pi \sin(\pi/N)}{N \cos^2(\pi/2N)}$$

Also, as  $N$  gets large,  $T$  behaves as  $\pi^2/2N$ .

Continued on Page MIT 35



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# MIT LIFE INCOME FUNDS

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In 1961, Norm moved to Albion Malleable Iron, a Michigan firm that mass-produced malleable iron castings for Ford, Chrysler, General Motors and American Motors. As these companies expanded their manufacture over-

seas, he became the manager of Hayes-Albion Corporation's international division, working in Brazil, Portugal, South Africa and other places, helping the transfer of technical expertise. In 1972, he became an independent industrial consultant and used his 37 years of experience to help design foundries in Brazil, Portugal and Mexico. He retired in 1980.

Norm and Elvie married in 1940. They have two children and four grandchildren.

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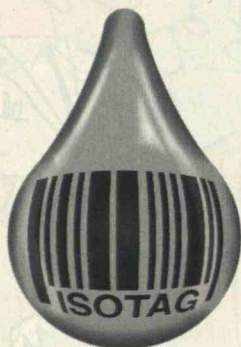


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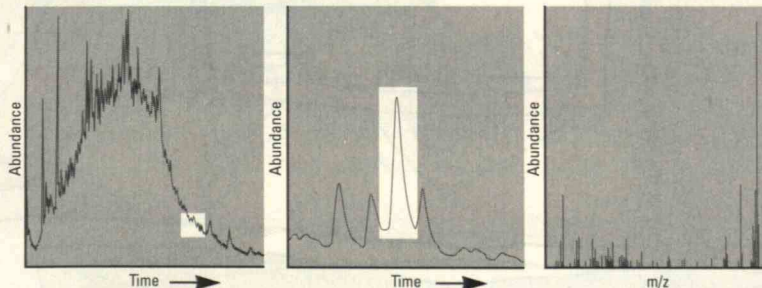
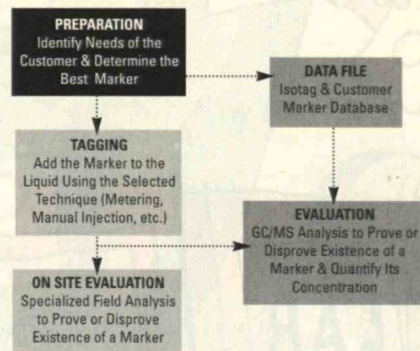
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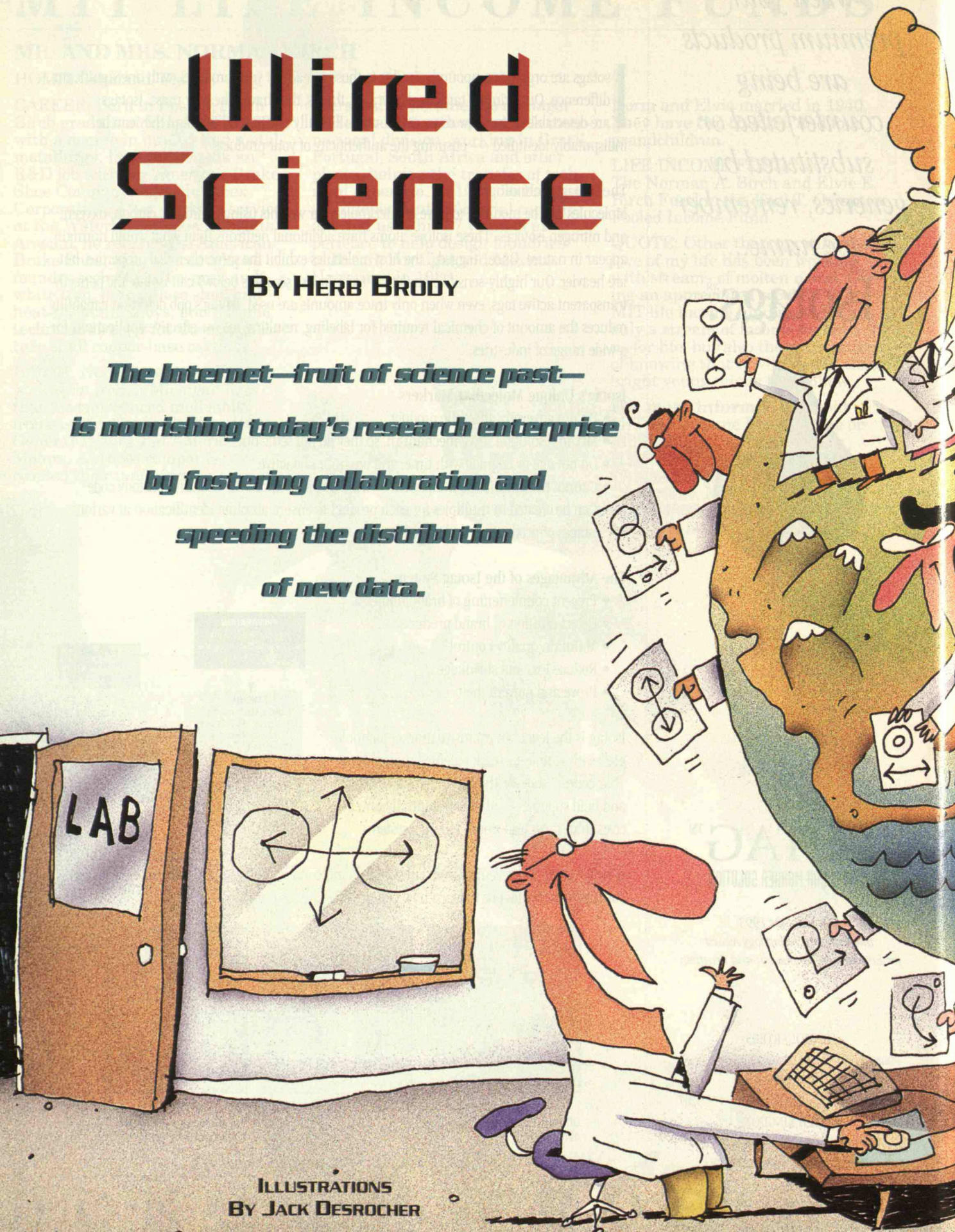
Typical Results from Isotag's Analytical Technique



# Wired Science

BY HERB BRODY

*The Internet—fruit of science past—  
is nourishing today's research enterprise  
by fostering collaboration and  
speeding the distribution  
of new data.*



ILLUSTRATIONS  
BY JACK DESROCHER







**P**HYSICIST Andrew Strominger says he is “usually the last one to get onto any new technology wave. The machines are not fun for me.” Maybe not, but Strominger, who studies cosmology at the University of California at Santa Barbara, recently conducted as good a demonstration as any of the value of the Internet—a white-hot technology if ever there was one—to those whose calling it is to understand the physical and biological world. Strominger wrote a paper that suggested a radical departure from Einstein’s conception of space-time as a smooth and continuous surface. Strominger e-mailed a question about the subject to Brian Green, who pursues similar research at Cornell. Green started to answer Strominger’s question, then read the article, which Strominger had just posted on the Internet. The two scientists entered into a brief interchange of e-mail, joined by David Morrison of Duke University, and three days later all three had cowritten and posted a second paper that further refined their theory showing that tiny black holes can be transformed mathematically into infinitesimal vibrating loops of energy, called superstrings.

That’s how science works these days. Labs around the world are in effect sharing a common chalkboard—the Internet. Theories, experimental results, shoot-from-the-hip notions all are shared, electronically, with the geographically dispersed community of people who find this information important. In astronomy, for example, “It used to be that many of the images sent back from planetary probes weren’t available for months or even years,” says William Emery, professor of aerospace engineering at the University of Colorado. “Now they get put up on the World Wide Web the next day.”

The Internet is not merely speeding up the same kinds of interactions that in the past would have happened in other ways. The many-to-many nature of the network medium is lowering barriers to collaboration. A physicist can draft a paper and e-mail it to colleagues around the world. Although ordinary mail and, more recently, the fax machine, provide the same basic function, the very malleability of electronic text encourages continuous revision and group-thinking. The result is that by the time a paper is submitted to a journal it will already have been scrutinized by the people most likely to detect its flaws.

Thus the opportunity for such exchange has meant that the concentration of scientists on the Internet has “reached a critical mass,” says Raymond Dessy, a professor of chemistry at Virginia Polytechnical Institute and an advocate of publishing more scientific research in electronic form. “I find that I’m using the telephone less and less, and that I use paper mail not at all.”

Yet the Internet’s ubiquity cuts two ways. Because Net culture encourages participation, online discourse bubbles over with the contributions of well-meaning amateurs as well as with the obsessive ramblings of those with axes to

*HERB BRODY is a senior editor of Technology Review.*

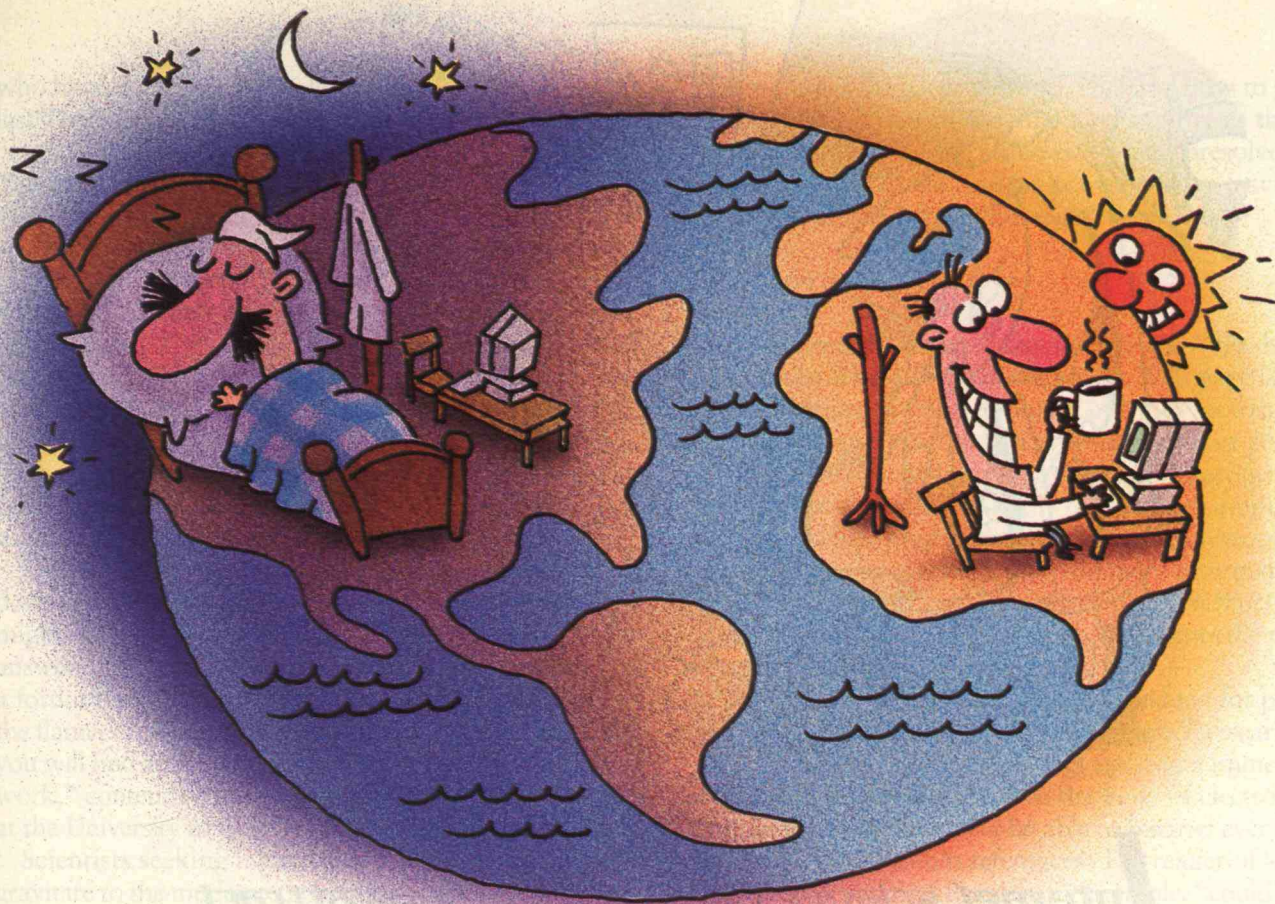
***E-mail fosters projects  
that never sleep. Scientists  
on one side of the world  
can send off results so  
their collaborators on  
the other side can  
immediately work with  
the information.***

grind. On the Internet’s Usenet discussion groups, “the signal-to-noise ratio is very low,” says James Phillips, a physicist at the Smithsonian Astrophysical Observatory in Cambridge, Mass. “I read a huge number of useless posts for every really helpful one.” Unmoderated Usenet newsgroups are “a chaotic babble,” agrees Ethan Vishniac, professor of astronomy at the University of Texas. “You get professionals, interested amateurs, completely uninformed passersby, and schizophrenic street people all talking at once.” And with the ease and low cost of setting up World Wide Web pages, the Net is becoming an overstuffed, underorganized attic full of pictures and documents that vary wildly in value. Still, by bringing researchers from all over the world into intimate intellectual contact with each other and with the data and theories that they produce, the Net has become a tool that is at least a convenience and at best an indispensable aid.

#### Two Major Events

**S**cientists were communicating with each other through computer networks long before the rest of the world caught on. Throughout the 1970s and ’80s, researchers at university and government laboratories exchanged data through ARPAnet, the military-funded network that evolved into the Internet. But electronic communication became firmly established as the primary





means of connection after two major events. One was the discovery in 1986-87 of a class of superconductors—materials that could carry electricity with zero resistance at temperatures much higher than conventional superconductors. Results flew out of labs around the world and onto the Net; for an intense period of several months, researchers announced startling results almost daily, as they checked out the latest findings with their own apparatus. When the bits settled, the science and technology of superconductivity had made a major leap forward. Because experiments could be set up and the data reported so quickly, the Internet provided the medium for a shift in global scientific consciousness.

The Internet also fueled the controversy over cold fusion. When chemists at the University of Utah made their controversial claims about a tabletop apparatus that could extract fusion energy, the rush was on to replicate their results. Researchers knew within days—sometimes even hours—whether a particular experimental setup worked. Claims and furious counterclaims flew through the Internet, which became the de facto forum for discussing and debating the often-controversial results. The firestorm over cold fusion, following so soon after the breakthrough in superconductivity, “changed the whole culture” of scientific communications, says Robert Park, a physicist at the University of Maryland and director of public information for the American Physical Society.

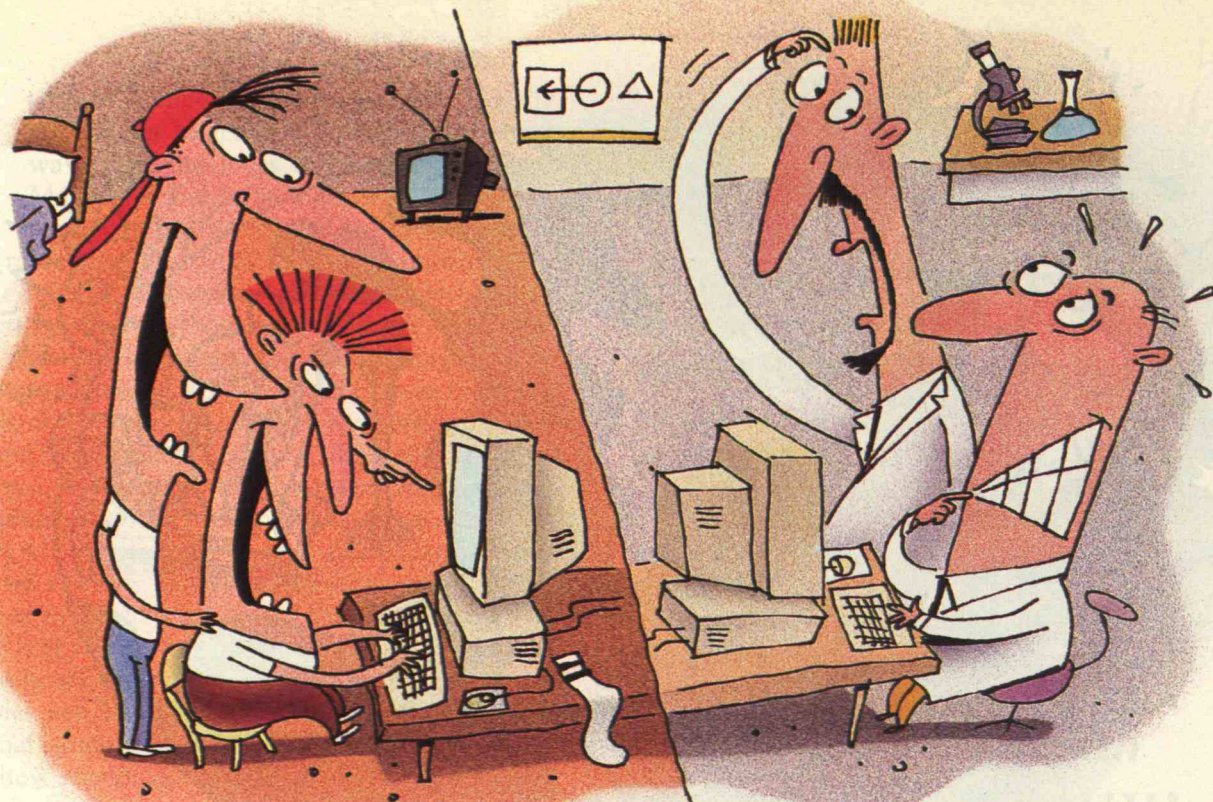
The discovery of high-temperature superconductivity and the claims of cold fusion gave the Internet a kind of legitimacy. In both cases, experiments were being conducted and theories proposed so rapidly, by scientists so dispersed, that there was no other practical way for crucial information to be shared in anything like real time. In the electronic medium, the usual lag time of publishing and conferences melted away.

### Rapid Coalescence

**T**oday, e-mail has become the informal “corridor” of the international research enterprise—the venue for bandying about not-yet-ready-for-publication ideas. Sending someone a quick, one-sentence e-mail message is “very much like knocking on someone’s door,” says John Walsh, a sociologist at the University of Illinois at Chicago Circle who has studied interactions among scientists.

E-mail has allowed researchers to expand the circle of colleagues with whom they consult. The time zones that foil attempts to collaborate by telephone can work to the advantage of e-mailing colleagues; U.S. scientists, for instance, can send off results of a day-long experiment in the evening so their Japanese collaborators can work with the information when they arrive at their laboratory the next morning. “You end up with a project that never sleeps,” says Walsh. “It turns science into shift work.”





**Internet science discussion groups attract  
a mix of well-meaning amateurs, students looking  
for homework help, and outright quacks, plus  
a few serious researchers.**

Besides fostering small-scale collaboration, e-mail also facilitates the large-group projects that have come to dominate certain scientific disciplines. Such "big science" typically involves hundreds of researchers at dozens of labs. One recent paper reporting on the search for the subatomic particle known as the top quark was co-written by no fewer than 398 authors, representing 34 institutions in five countries. Such groups coalesce around huge, expensive pieces of equipment—in this case a particle collider at Fermi National Accelerator in Batavia, Ill. "Bigger science takes more people, and the Internet lets you do that more easily," says Walsh.

The Internet has also made it far easier for scientists to form ad hoc collaborations on topics outside their main expertise. Virginia Tech chemist Dessy, for example, has a strong interest in the physics of woodwind instruments. He recently cowrote a paper with other scientists in Australia, New Zealand, and Canada that discusses, in a way that runs counter to intuition, why the pitch of such instruments depends on their shape. The Internet, says Dessy,

allows groups to "spontaneously coalesce and dissolve." An important advantage, he says, is that the Net provides insulation from the sometimes prickly personality clashes that can occur during face-to-face collaboration. Members of the international trio "were able to catch each other's false starts quickly, before egos became heavily invested," he says.

Electronic communication can also help scientists sustain relationships that they initiate through more conventional channels. Graduate students, for example, can easily keep in touch with their former professors. Scientists who spend a few months or a year at another institution can maintain the contacts that they established there. And researchers can continue the often intense conversations that they strike up at numerous professional conferences.

Unfortunately, e-mail's very ease of use introduces a problem, notes Phillip Helbig, a cosmologist at the University of Hamburg. Because it is so easy to write e-mail and send it to more than one recipient, he says, "some of us are swamped with unsolicited messages from crackpots



who have allegedly solved all problems of modern physics last Thursday in their backyard.”

## Tapping Usenet's Chaos

The dozens of subject-specific Usenet newsgroups that are available through the Internet would seem to offer another ideal forum for discussing scientific ideas. In practice, however, Usenet does not fulfill this role very often. The general-purpose groups such as sci.physics and sci.chemistry typically attract queries and responses of the undergraduate level or lower. The quality of discourse is further reduced by quacks, malcontents, and well-meaning but ignorant folks who mistake the ability to eavesdrop on a conversation with the right to disrupt it.

Indeed, Usenet science newsgroups sometimes seem to degenerate as if by entropy. At first, reputable scientists might read the discussion and contribute some ideas or answer questions. Soon, however, the newsgroup becomes a forum for students seeking homework help. Then come the flamers and crackpots. Therefore, Usenet is “not where you will find active and serious researchers discussing their work,” contends Steven Giddinger, a professor of physics at the University of California at Santa Barbara.

Scientists seeking higher-quality information tend to gravitate to the moderated Usenet newsgroups, where one or more individuals serve as gatekeepers who screen out trivial, repetitive, and incoherent submissions. The moderator of sci.astro.research, for instance, stipulates that “postings will be judged on their relevancy to scientific research in astronomy and astrophysics,” and that inquiries such as “will the sun blow up one day?” are likely to be redirected to the unmoderated group, sci.astro.

Even in the more specialized forums, many participants solicit practical information rather than exchange basic ideas: Which vendor sells the best instrument for this particular experimental setup? Can anyone recommend reading on an aspect of my research? In a typical exchange in the newsgroup devoted to the study of butterflies and moths (sci.bio.entomology.lepidoptera), for example, one person expressed interest in recent research on the behavior of ladybugs. Within minutes, a reply appeared, citing an article in a journal of the British Entomological Society, along with that publication's e-mail address. Jon D. Moulton, an adjunct instructor of microbiology at Portland (Ore.) Community College, similarly recalls posting a question to the group sci.bio.microbiology regarding the movements of electrons within biochemical systems; a few days later, he says, he received e-mail suggesting a recent text that contained just the information he was looking for.

“It's the little things that have been solved over the Internet,” says Andrew M. Smith, who manages a mailing list for scientists who specialize in chromatography—a collection of techniques for determining the chemical constituents of a liquid or gas. Smith says contributors to the mailing list offer information such as “what types of

buffers to use for particular analyses” and how to get the longest lifetime out of the thin glass capillaries through which samples flow. Such questions, left unresolved, can “slow a project down by days or even weeks, leaving the scientist frustrated and overbudget,” says Smith.

## Science on the Web

The scientists who are busy shunning Usenet show up on the World Wide Web, since a Web page is much easier to stamp with an emblem of legitimacy than is a Usenet posting. Visitors to a university's home page can easily hop to sites maintained by various departments and laboratories. Much of what is found there amounts to scrapbook-like snapshots of buildings and people. But many departments also include summary information on their projects, with links to published papers. Such easily accessible background information streamlines the process of scouting out new work.

In some ways, the Web is the ideal medium for presenting scientific research. References to other research can include a hypertext link that brings the reader immediately to the data being cited. And as the body of electronic literature grows, readers will be able to burrow ever deeper using references within references. The reader of a paper on new mathematical theories, for example, “could follow the thread all the way back to Euclid,” says Herbert Wilf, a University of Pennsylvania mathematician.

The Web also offers another advantage: “When you post on the Web you can make accessible not only your data but also the software you have used to calculate the data,” says Martin Hoffert, a physicist at New York University. This is increasingly important because technologies such as satellite imaging systems and particle accelerators collect huge amounts of data. Making sense of this information often requires specialized software that, for example, creates from the raw numbers an easy-to-manipulate three-dimensional visualization. The Web can present not just text but sound, pictures, and animation.

In some areas of research—cosmology, for example, or modeling of large protein molecules—software-based simulations are not just frosting on the cake but the main course. Research can best be presented by displaying computer-generated renderings. After all, “we can't just whip up a galaxy, so we have to substitute computation for experimentation,” says William A. Wulf, a computer scientist at the University of Virginia. Sound, pictures, and animation can all be built right into a Web page along with text. “I used to think those things were frivolous,” says Wulf. “But they're not—after all, 90 percent of our neurons are for perception.”

Now scientists can readily upload software code to their Web page; anyone who retrieves the data can just as readily download the software needed to probe it. Making such software readily available is the “most important” change that the Internet has wrought, says Colorado's



Emery. Indeed, libraries of free software for scientific purposes are blossoming all over the Internet. Programs that in earlier days would have been written for purely personal use are now made available on the Web, free for the downloading. Hamburg's Helbig has filled his Web page with links to numerous Fortran programs and subroutines that he has written to help him with his research on the gravitational lens effect—the bending of light by huge gravitational fields produced by massive cosmic objects.

The transfer and usage of software through the Net has become for many researchers as essential—and routine—as e-mail. Andrew Cooke, an astronomer at the Institute for Astronomy in Edinburgh, Scotland, reports that he is analyzing data taken from an observatory in Chile along with U.S. collaborators. The data, he says, were copied directly across the Internet to his workstation in Scotland and then processed using software he had retrieved earlier from the Image Reduction and Analysis Facility in Tucson, Ariz. After correcting the raw data for instrumental effects, Cooke and his colleagues probed it further using programs and help obtained—through the Net—from the Rutgers university group who built the spectrograph.

Netlib—a Web site maintained jointly by AT&T, the Oak Ridge National Laboratory, and the University of Tennessee at Knoxville—contains the source code for scores of programs relating to research in mathematics and computational science. Although Netlib has been operating since the mid-1980s, usage has grown tremendously in the last three years with the soaring popularity of the World Wide Web. In 1993, the system logged about 250,000 requests to download a program; that shot up to more than 5 million in 1995 and more than 3 million through mid-June of this year.

### Exploiting the Medium, Widening the Distribution

So far, researchers have used the Internet as a natural extension of other communication tools. But the push is on to exploit the Internet more systematically.

The biggest target for reform is scientific publishing. Conventional print journals operate at a stately pace more suited, some believe, to the nineteenth century than the twenty-first: the lag time between submission of a paper and its appearance in print is measured in months and sometimes years. Some of this delay is due to time spent on peer review—an essential part of the research process. But even after such review has occurred, articles often must wait their turn for publication. These journals therefore serve mainly as archival records and have little impact on the accelerating scientific conversation. “Journals play no role whatsoever for physicists,” asserts Paul Ginsparg, a physicist at the Los Alamos National Laboratory and the creator of an electronic database of “preprints”—papers that have been submitted to journals but not yet published. The main purpose of journals, he suggests, is to “provide a revenue stream to publishers.”

Ginsparg's database receives some 500 new articles per week, and is accessed 40,000 times per day. The preprint archive “has become my lifeline to current work,” says University of Texas astronomer Ethan Vishniac, who notes that the distribution of preprints without the Internet is “spotty.” Vishniac says he gets abstracts of 5–10 papers daily from the online bulletin board, which “makes it possible to keep up with what's going on across astronomy and to find out about work as it happens.”

Journals are also an expensive and inefficient way to disseminate information. Since subscriptions cost as much as \$10,000 a year, only the richest institutions in the wealthiest countries can afford to stock the full range of scientific publications. And even if funds are available, where can all these stacks of bound paper—what Ginsparg calls “chemicals adsorbed onto sliced, processed dead trees”—be stored? A report issued by the Association of Research Libraries concurs that “the volume of material published is increasing rapidly in scientific and technical fields and no library can easily hold most of the materials of interest to its user community.”

Some maintain that the Internet could solve this problem by becoming the primary medium of publication. Pennsylvania's Wilf, along with fellow mathematician Neal Caulkin of the Georgia Institute of Technology, founded and operate the *Electronic Journal of Combinatorics*, one of a handful of scholarly journals on the Web that has no print counterpart.

Such a move has several powerful benefits beyond the obvious one of accelerating the distribution of results. For the price of a few journal subscriptions, a library can outfit itself with computers capable of the most sophisticated Internet access. Papers in a Web-based journal can be revised from time to time not only to update data and correct errors, Wilf points out, but also to add links to subsequent research in which the paper is cited. “I expect that scholarly publishing will move to almost exclusively electronic means of information dissemination,” predicts Andrew Odlyzko, a mathematician at AT&T Bell Laboratories in Murray Hill, N.J., who has become something of the godfather of scientific publishing on the Internet after writing an influential essay last year in the *International Journal of Human-Computer Studies* entitled “Tragic loss or good riddance? The impending demise of traditional scholarly journals.”

The move to electronic publication has another powerful benefit: it helps bring into the conversation scientists working at smaller, less prestigious institutions. The isolation of such researchers has been exacerbated by the tradition in some disciplines of working around the lag time of printed journals by mailing and faxing submitted articles to a small group of people in the same sub-discipline. The distribution of these preprints—the working documents of the research community—determines whether a scientist is in the loop, and that system tends to perpetuate the advantages of well-connected senior





**Internet archives could supplant print journals,  
which operate at a stately pace more suited to  
the nineteenth century than the twenty-first.**

researchers. The Internet wipes out that advantage.

Everyone who has access to the World Wide Web, from Nobel prizewinners to junior faculty and students, can tap into the preprint archives such as the ones Ginsparg has established. With electronic distribution, younger and less well-placed scientists can sip from the same brew of new knowledge as their elder and more prestigiously employed research brethren. "The Web allows me to be part of that flow of informal information," says biology professor John Rueter of Portland State University. "I am the only faculty in my research area at Portland State, so when I walk down the hall there aren't a dozen posters about meetings and seminars" the way there would be at a larger research university.

"Scientists have always shared results with their 10 best friends," says Maryland physicist Park. Often, he says, "you'll find at less prestigious institutions scientists who are very smart but who are working on the wrong problems. The Net spreads knowledge around much more democratically."

Even a preprint database such as Ginsparg's may no longer be necessary, says Stevan Harnad, director of the Cognitive Sciences Centre at the University of Southampton in England and an advocate of online scientific publishing. With tools for searching the Web rapidly becoming more effective, Web users will find preprints and approved papers simply by calling up a search service such as Alta

Vista and tapping in some key words. The idea, Harnad says, is to decentralize control of publishing and "just let the Web gremlins find the papers."

#### Is Faster Better?

**D**espite the Net's promise of creating a tightly connected, global community of researchers, several impediments block more widespread use. While collaboration through e-mail can work well once a professional relationship is established, there is not yet a good way to simply start chatting with someone without an introduction—the kind of thing that happens all the time when scientists rub elbows at a university or conference. Usenet could ultimately play this role but still suffers from the perception that a person posting a message is probably not worth taking seriously. A recent scanning through a number of science-related newsgroups revealed few postings by anyone who identified himself or herself as a bona fide research scientist.

Competitive pressures also work against the kind of collaboration that the Internet facilitates. Although the Net encourages information sharing, scientists typically guard certain pieces of their work from rivals pursuing similar problems. What scientists need is an easy technique for making some components of their work publicly available—as on a Web page—and other parts of it accessible



only to certain people, or members of certain organizations. Right now, a Web page is essentially a public document. While password protection schemes can be put in place, they run counter to the prevailing ethos on the Net.

Another problem is that reading the material posted on the Internet can be a chore. To save disk space and shorten transmission times, for example, the high-energy physics archive at Los Alamos stores papers in a compressed format. Attempting to download a paper from the World Wide Web to a PC or Macintosh using Netscape, the most popular Web browser software, produces pages of gibberish. Looking for help on the Web page brings a frustrated user to the instruction to "download the files by hand" and "unpack manually." The page provides links to documents containing the tools—the equivalent of software picks and shovels—to perform this "manual" operation. It's as if a visitor to a library had to obtain a special kind of eyeglasses before reading each kind of book or periodical.

Even when the Net works flawlessly, some scientists worry that reliance on electronic communication overvalues speed at the expense of deliberation. As companies and government agencies cut funding for R&D, scientific competition can get cutthroat—and the Net's accelerated pace contributes to the pressure. In years past, the lag time between submission and publication of a paper provided a kind of cushion, as long as you got your idea published within two or three months of a rival's publication, you could legitimately claim that the discoveries occurred essentially simultaneously. No longer, says physicist Strominger: "If a paper comes out on the Net, you don't have months to get your own online," he says. "Things get rushed."

The system of peer review, although imperfect, generally ensures that published papers exceed some threshold of merit. A scientist trying to glean useful information from the Internet, by contrast, has a lot of sifting to do. Bypassing journal editors and the peer review process ensures rapid turnaround, but what good is speed if the material itself is unoriginal or, worse, just plain wrong?



***The Internet  
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to action.***

In one sense this is a problem of truth-in-labeling. Under the traditional system of publishing, readers of paper preprints that have not yet passed peer reviews understand their provisional status and value them accordingly. A paper that appears in the published journal, on the other hand, is held to a higher standard in which the authors have presumably addressed critiques of their work.

Electronic media could similarly support such a two-tiered system, says Southampton's Harnad, who notes that scientists could routinely put a preprint of a paper on the Web when they submit it to a journal. Once the authors satisfy the queries of peer reviewers, they could re-post the paper accompanied by some kind of seal of approval. Indeed, the Internet promises to shake up the entrenched process of peer review. Comments can be submitted and attached to an electronically published paper ad infinitum, and the authors can respond by transmitting a corrected and refined version.

But some in the business of publishing paper scientific journals question the feasibility of the online alternative. The work of producing a high-quality scientific journal is beyond the reach of an ad hoc group of volunteers, says Park. Much of the editing and production work that goes into a paper journal will also be required for an online one, he says, and the professional staff needed to handle these jobs will be costly. "Nobody knows how to make these online journal things pay."

A system of online journals would sustain itself economically, Harnad contends. Because scientists want their work to be read and used as the foundation of future research, they have traditionally been willing to pay to have their papers printed—a model far different from that prevailing in other parts of the publishing realm. Scientists also pay to have their preprints produced, duplicated, and distributed through mail; they would presumably be willing to pay similar fees to have their work distributed in a refereed online journal.

After all, the authors of scientific research papers "don't want the readers' bucks but their brains," says Harnad. It



has only been out of “reluctant necessity,” he maintains, that scientists—and indeed practitioners of any esoteric scholarly activity—have “entered into the Faustian bargain of allowing a price tag to be erected as a barrier between their work and its intended readership, for that was the only way they could make their work public at all.” Scientists, he says, “want only to reach the eyes and minds of peers the world over, so that they can build on one another’s contributions in that cumulative, collaborative enterprise called learned inquiry.”

This idea is beginning to come to reality on the Web with specialized journals on topics ranging from archaeology to artificial intelligence. Harnad has himself set up a database of articles in the cognitive sciences, which he says will contain materials from “very early draft ideas” through papers that are undergoing peer review through finished, peer-reviewed reprints. Net users will also be able to download revisions of published pieces along with comments from readers and responses by the authors. Moreover, the documents will be linked to the abstracts and (where available) full texts of all articles that are listed as references.

At its best, the Internet serves science in the same manner as other great advances in scientific instrumentation that have amplified humans’ ability to observe the universe. The telescope led, through Galileo and Kepler, to Newton’s sparkling insights on classical mechanics. With the microscope came the discovery of whole realms of life in the microworld, spurring scientists on to better understanding of biology and disease. The x-rays that peered inside crystal structures and the spectroscopes that sensed with precision the nature of electromagnetic radiation provided the experimental foundation for quantum mechanics. The Internet, too, illuminates what had generally been invisible—not by amplifying human senses but by multiplying by many times the number of minds available to focus on the questions that prod scientists to action. ■

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# Technology Review Photo Contest

## **A** piece of shiny metal rusts.

*A town’s main street blossoms into a vital commercial thoroughfare, then decays after highways and malls rise up nearby. A ringing sound grows fainter.*

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## **T**iming is everything:

*all entries must be postmarked no later than*  
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*Send no more than six previously unpublished*  
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# Something Snapped

BY PHILIP LOPICCOLO

*A* she read through police reports of the bizarre homicide, Anneliese Pontius, the forensic psychiatrist assigned to the case, was as puzzled as everyone else. On paper, the alleged killer, whose mental status she was to assess, seemed unremarkable. A handsome male in his early twenties, Ian Walter (not his real name) had no criminal record and no history of violence. In fact, acquaintances described him as reclusive and shy. But a few days earlier, this mild-mannered social loner had gone berserk.

❖ While picnicking with a companion, Walter is suddenly overcome by a strange feeling. He imagines seeing two large white male dogs fighting but is puzzled because he knows only one such dog is really present. Intrigued, he chases them, but the dogs run away and vanish “into nothing” as they jump over a river. ❖ In their place, Walter sees a fisherman in waders holding out a fly rod. Suddenly, Walter charges the man—a total

ILLUSTRATIONS BY POLLY BECKER





**A** SCIENTIST FIGHTS TO ESTABLISH A NEW THEORY  
THAT EXPLAINS, AND MAY HELP TO PREVENT, SUDDEN  
AND SEEMINGLY INEXPLICABLE ACTS OF VIOLENCE.



stranger toward whom he harbored no ill feelings—and pushes him underwater, saying, “I’ll teach you how to fish like a bear.” The man, in his forties, finds a rock and tries to hit Walter in the face. Meanwhile, Walter’s picnic companion arrives, grabs his head, and shouts, “No! No! Don’t do it!” But Walter, seemingly emotionless, bites her finger and holds the man under until he drowns. He then tries to drown his companion too, but he suddenly comes to his senses and lets her go.

Next, hallucinating that he hears the sound of bloodhounds, Walter takes off his bright red shirt and hides it, thinking he won’t be as easily detected. He goes home, takes a shower, and, when the police arrive, readily confesses not only to the drowning but also to murdering a shopkeeper, which turns out to be a complete fabrication. He feels so remorseful that he later tries to hang himself in his jail cell, but the bootlaces he uses break.

By the time she finished examining the file, Pontius, a psychiatrist at Massachusetts General Hospital and associate clinical professor of psychiatry at Harvard University, suspected that the case might not be as inexplicable as it seemed. In thousands of interviews with convicted felons over the past 36 years, she recalled seeing this precise pattern several times before. In fact, she reached a point 15 years ago when she decided to begin documenting these odd cases. And since then, from examinations of more than 200 alleged killers, she has recorded the details of some 20 examples of social loners like Walter who committed eerily similar brief psychotic acts.

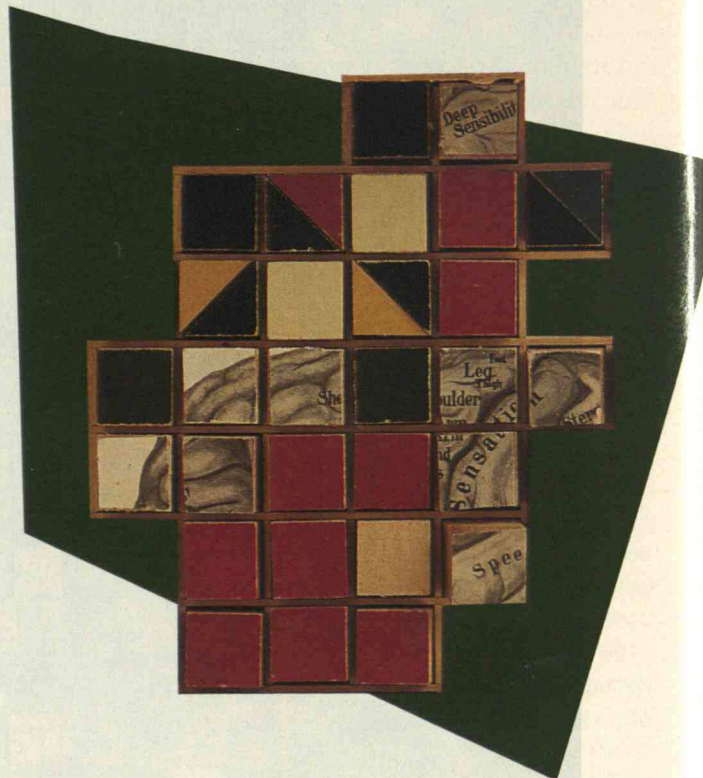
From her analysis of these cases, she has proposed a radical new theory: that certain shy and lonely people who ruminate about stresses and traumas that most people vent to family members or friends may be at risk of a type of brain seizure that can produce extreme and potentially lethal behavior. Her research could have profound legal implications if used as a new insanity defense. Perhaps more significantly, it could change our attitudes about long-term loneliness and lend support to the notion that some form of intervention is vital, particularly at an early age.

## MOTIVELESS MURDERS

As Pontius began studying each odd new case in greater depth, she was struck by how incongruous they all seemed with respect to typical homicides. Indeed, most murderers have both a motive and a plan. They tend to have strong feelings of rage, jealousy, and greed. They usually kill people they know, often members of their own families. And they normally do not experience sudden brief psychotic episodes.

Pontius’s cases appeared vastly different from one another in their specific details, but she found on closer examination that each was fundamentally the same in at

least a dozen significant ways. All featured reasonably healthy young men who were social loners with no plan or motive for committing a homicide. Just before the attack, each felt puzzled by strange hallucinations or feelings about suddenly revived past memories. The murder itself was carried out without rage or feeling, much like an animal kills its prey. During the act, the perpetrator felt spontaneous visceral responses—such as nausea, racing heart, and incontinence—and experienced escalating psychotic hallucinations or delusions, often of grandeur. When



the killer snapped out of his altered state, which usually lasted only a few minutes, he had almost total recall of the homicidal act. Still, he made no reasonable attempt to conceal it but rather often acted “stupidly” and felt overwhelming remorse, frequently turning himself over to the police or attempting suicide.

Because of these remarkable similarities, Pontius believed, the cases could not be written off as mere anomalies or coincidences. Nor could these symptoms be adequately classified by vague labels such as “atypical psychosis” or “brief psychosis not otherwise specified” or “organic delusional disorder.” “Those are just wastepaper-basket terms,” she maintains, “with no explanatory value and therefore no potential remedial value.”

## A NEW SYNDROME

In search of a more specific and useful diagnosis, Pontius ruled out the well-established disorders that share some of the same symptoms. For example, while some epileptic seizures can cause sudden hallucinations, they cloud con-



consciousness, often to the point of a total blackout, leaving the victim both incapable of performing a complex act like murder and unable to remember much about any activities performed during the episode. Likewise, schizophrenia causes delusions and hallucinations, usually auditory, but it is a recurring, long-term condition characterized by specific thought disturbances and lifelong coping problems. Post-traumatic stress disorder, which is caused by traumas experienced during war, natural catastrophes, or other violent encounters, can be accompanied by visceral reactions, but the condition persists for years, usually without psychosis or violence. Panic attacks, which also entail spontaneous visceral responses, result in recurring avoidant behavior, not aggression.

Pontius also eliminated several other well-known but less-common disorders that researchers have recently sug-

highly developed frontal-lobe system, which composes fully one-third of the brain. Indeed, we know from positron emission tomography (PET) scans, functional magnetic resonance imaging (fMRI), and other modern brain-imaging techniques that the frontal lobes are most active when the brain is performing so-called executive functions, such as planning ahead, postponing gratification, and considering the consequences and implications of actions, which essentially define socialized behavior.

But if the limbic system becomes overstimulated, Pontius theorizes, it might temporarily overwhelm the frontal lobes—with which it has an intimately reciprocal relationship—and thus the ability to control animalistic urges. Such an imbalance, she believes, could produce the very symptoms exhibited by the specific subgroup of felons she has been studying.

## UNEXPLAINED HOMICIDAL BEHAVIOR BY SOCIAL LONERS COULD RESULT FROM A SEIZURE OF THE BRAIN'S LIMBIC SYSTEM, WHERE AGGRESSIVE SURVIVAL DRIVES ORIGINATE.

gested to explain the behavior. Some argue, for example, that temporal-lobe epilepsy, which occasionally leaves its victims irritable and aggressive between seizures, might be responsible for such explosive actions. But Pontius thinks this does not apply. As evidence she points to a recent study of between-seizure aggression in some 5,400 cases that found only one instance of mildly aggressive behavior that was nowhere near the level of violence evinced by her subjects.

Finally, others suggest that homicidal behavior might occur during a dissociative state, in which a person with multiple personalities takes on the identity of a dangerously aggressive self. But Pontius notes that behavioral changes in people with dissociative or multiple personality disorders are usually recurring and much longer lasting than the fleeting changes demonstrated by her subjects.

Unable to apply a known diagnosis, Pontius began to explore whether the dozen or so symptoms that each perpetrator exhibited could be caused by a malfunction in a mysterious part of the brain—the limbic system—where aggressive drives originate. Experiments in which scientists observed the behavior of animals whose limbic systems have been damaged have shown that it is a center of emotion and memory and is responsible for aggressive behavior—such as predatory or defense killing—that has helped ensure the survival of the individual or the species.

In humans, limbic drives are usually held in check by the

One way the limbic system could become hyperstimulated, Pontius suggests, is by undergoing the same kind of electrical storm that causes seizures. But unlike seizures that attack the frontal lobes or other highly advanced brain systems—thus clouding or impairing a victim's reasoning ability, consciousness, and memory—a limbic seizure might be more selective, she says. Such a “partial” seizure might leave the rest of the brain largely intact and functioning, albeit impaired, as it is temporarily unable to control the supercharged aggressive drives.

### IN SEARCH OF A TRIGGER

Pontius is convinced that she has identified a cluster of unique symptoms and a probable underlying cause—a brain seizure—that together define a new syndrome, which she has termed limbic psychotic trigger reaction. When it comes to explaining what the “trigger” would be for such an extreme response—the all-important next step in the process of determining how to help people suffering from the affliction—she offers what she feels is the most likely cause but admits that it is both preliminary and as yet unproven.

As she began searching for a trigger—or, more formally, an engendering neurophysiological mechanism—Pontius reviewed the medical records of her subjects and asked them to undergo electroencephalogram (EEG) studies,



computed tomography (CT) scans, or magnetic resonance imaging (MRI) studies. She found scattered abnormalities in some of the cases but no evidence of a common brain affliction. Yet when she once again employed the analytic tools of her trade, detailed clinical observations and patient interviews, she discovered in each case a powerful, highly individualized external stimulus—a specific event that revived the memory of a stressful experience from the past—that she believes “kindled” a limbic seizure capable of causing homicidal episodes.

Pontius points to neurophysiological research to support this notion of seizure kindling. In fact, over the past three decades researchers have induced brain seizures in a wide range of mammals, “from rats to monkeys,” she says, with no evidence of structural brain damage merely by subjecting them to harmless, repetitive, intermittent stimuli—

very clear picture of it in my mind,” he said. “He is looking back sideways, a fly rod in his hand, holding it out and smiling.” When Pontius asked him to draw a picture of his fisherman-victim, he drew what she describes as “a man in fishing gear, with waders, in half-body profile, full face, holding a fly rod into a river.”

Pontius suggests that Walter’s inability to share his thoughts and feelings with anyone about his father’s death prevented him from “laying them to rest.” As Walter was growing up, he was frequently reminded of his father, especially when he saw his brother’s photo of him. Many such stresses may have contributed to Walter’s precarious mental state. But Pontius assumes that the sight of a man in waders with a fishing rod striking his father’s familiar pose was the trigger stimulus that vividly revived Walter’s memories about his father and

# BRAIN-SURGERY PATIENTS WHO UNDERGO ELECTRICAL STIMULATION OF THE LIMBIC SYSTEM DESCRIBE THE SAME SYMPTOMS EXPERIENCED BY PERPETRATORS OF THE IRRATIONAL MURDERS.

electrical shocks or periods of isolation, for example.

Pontius found that Ian Walter’s psychological history correlates with the kindled-seizure concept. The initial stimulus in Walter’s case, an unforgotten experience from his childhood, she believes, was that his father died suddenly when Walter was five years old. According to his mother’s account, Walter did not express any sadness over the death. He had argued with his father just before his fatal heart attack and did not attend his funeral. “Good riddance,” he had said. “After all, I was mad at Father anyhow.”

After his father’s death, Walter became isolated. He apparently wasn’t close to his well-to-do mother, since he was raised by her servants—a married couple he described as disciplinarians. Nor was he close to his three brothers who were one to two decades his senior. Throughout his childhood, adolescence, and early adult years, it seemed that he had failed to develop a lasting and trusting relationship with anyone but rather had only fleeting, superficial relationships. When Pontius asked him which animal he identified with, he responded, “The bear resembles me most. He is strong, isolated, and he hibernates.”

In the interview, Walter spontaneously recalled memories of his father teaching him to fish. Most significantly, he said that for as long as he could remember, he would frequently see a photograph in his older brother’s living room of his father in fishing gear in a specific posture. “I have a

kindled a partial limbic-system seizure that finally pushed him over the brink.

The first signs that the seizure was creating an imbalance between the limbic system and frontal lobes, Pontius says, was Walter’s puzzlement and hallucination about two large white dogs fighting and his distorted sense of time (he believed he stalked the dogs for “only a few paces,” while witnesses said the chase lasted at least several minutes).

In the next phase of the seizure, during which Walter drowned the fisherman, the frontal lobes weren’t able to contain the aggressive impulses coming from the limbic system, but Walter was able to continue functioning on most other levels. For instance, he remained conscious but behaved completely out of character and illogically, as evidenced by the act itself and his telling the victim he would teach him to “fish like a bear.” He also had full control of his motor skills, which enabled him to carry out the attack, and was able to find his way home and retain a detailed memory of the events when he began to recover some 15 or 20 minutes later.

In the final stage of the seizure, the frontal lobes were regaining control over the limbic system but had not yet fully recovered. During this period, Walter suddenly abandoned drowning a second victim but experienced auditory hallucinations of bloodhounds barking and acted inefficiently in his attempts to conceal the crime by hiding his shirt and simply going home to take a



shower after having sweated profusely. His false confession of having killed a shopkeeper was also a likely sign of lingering frontal-lobe dysfunction.

#### WHERE'S THE PROOF?

Pontius's theory has generated a storm of controversy in the psychiatric community, and not just concerning her proposed trigger of a kindled limbic seizure—which she admits is debatable—but also about whether she has even defined a new syndrome.



Unfortunately, Pontius points out, proof is hard to come by, just as it is for most other partial seizures such as temporal-lobe epilepsy, which, despite being recognized as a syndrome for half a century, is still mainly a diagnosis based on behavior. For one thing, the EEG studies she has conducted on her subjects could not be definitive, even if by some chance a seizure were triggered during testing. That's because the EEG is merely a crude way of recording electrical activity from the surface of the brain, she explains, and is not nearly sensitive enough to detect readings from structures residing as deeply as the limbic system. Furthermore, even the most advanced deep-brain imaging technologies, such as PET, FMRI, and single proton emission computed tomography (SPECT), are not sophisticated enough to prove that a limbic seizure causes homicidal behavior, she says, even if these brain-scanning techniques could be performed during the act.

But Pontius points to physical evidence that she thinks

does support her hypothesis, at least indirectly. Rather than trying to recreate settings that might trigger bizarre behavior (which, even if permitted, would be difficult as well as dangerous), and then trying to identify any abnormal electrical discharges in the limbic system, she wondered what would happen if the scenario were reversed. In other words, if the limbic system were purposely overstimulated, what perceptual and behavioral changes would a subject exhibit?

Obviously, inserting electrodes into someone's brain would pose both practical and ethical problems. But in 1982, a team led by Pierre Gloor, a neurologist at the University of Montreal, conducted just such experiments on about 45 subjects—albeit not to test new theories about the behavioral effect from partial seizures of the limbic system. Rather, his group was attempting to pinpoint the source of seizures in patients with severe temporal-lobe epilepsy so neurosurgeons could excise the smallest possible portion of the brain necessary to short-circuit the neural surges.

Gloor's group surgically inserted electrodes at various points in each patient's brain and, because brain tissue lacks pain receptors, left the electrodes in place for several days, even while the patients remained conscious. As Gloor electrically stimulated a portion of the limbic system called the amygdala in the patients, each described symptoms that correlated remarkably with the specific experiences recalled by the felons Pontius had assessed—including visual or auditory hallucinations, strange indescribable feelings, unusual visceral sensations, time distortions, and revived memories.

Though Pontius believes Gloor's study provides compelling evidence, many remain skeptical. "It certainly fits in with the anatomy and behavioral physiology of the syndrome that she proposes," says Joseph Coyle, chair of the psychiatry department at Harvard. "But for all we know, Gloor's results could be coincidental," he says. "What still needs to be demonstrated is that the behavior she describes is related to abnormal electrical activity in the brain, and that the electrical activity is triggered by a particular percept."

One of those who do find Pontius's theory persuasive is Bernhard Fox, a professor of psychiatry and behavioral sciences at Boston University School of Medicine. First of all, he says, while journals usually demand eight cases before they will accept claims of a new syndrome or disease entity, Pontius has already identified more than twice that many. Second, he points out, she has listed about a dozen specific criteria common to each of the cases—more than enough to define the syndrome. "I find that just a few of the criteria—that the murderers did not act deliberately, had no plan or motive, did not try to conceal the crime, and felt extreme remorse—to be very powerful evidence for a new syndrome." Overall, he says, "I would say that this stands a good chance of being cross-validated by other people, once they take a good look at it."



Another aspect of Pontius's theory that Fox and others find significant is that limbic seizures may appear in degrees. The researchers speculate therefore that they may be much more common and varied than might otherwise be expected. Indeed, Pontius points out that not all of her cases entailed homicides; some involved other limbic survival drives such as acquisition and sex.

Consider the experience of the devout 55-year-old monk living in a monastery in New England who was on an outing to the city. When he reaches into his pocket for the money he thought he had been given, he finds he has none. Suddenly, he decides to rob a nearby bank. He walks up to the teller and convinces her to give him \$100. He takes the money, goes to a topless club, and starts fondling the performers, telling them his sudden delusional belief that he is a greater painter than Rembrandt and a better writer than Thomas Merton, a renowned monk and author. Suddenly, he snaps out of it and goes straight to the police and confesses. At first they don't believe him. But when the bank confirms his story, they arrest him and send him to the hospital, where Pontius examined him and suggested he be returned to the monastery and kept under closer surveillance.

During the interview with the monk, Pontius learned that he had grown up very poor during the Depression and was distraught during his childhood that his mother had to work as a domestic servant. Several years later, when he entered the monastery, he took a vow of poverty. Pontius maintains that the stresses associated with his family's poverty during his childhood may have been repeated many times during the monk's years in the monastery. The fact that he lived a lonely life in which he did not share his memories about these often-repeated experiences, she says, may have contributed to the limbic seizure, which may have been triggered by reaching into a pocket for money and finding none.

"Less extreme cases might not ordinarily come to the attention of anyone," says Pontius. But a specific, personalized trigger may frequently cause limbic overactivation in some social loners who harbor their emotions over a long period. As a result, they may suddenly do "irrational things that ruin their whole lives."

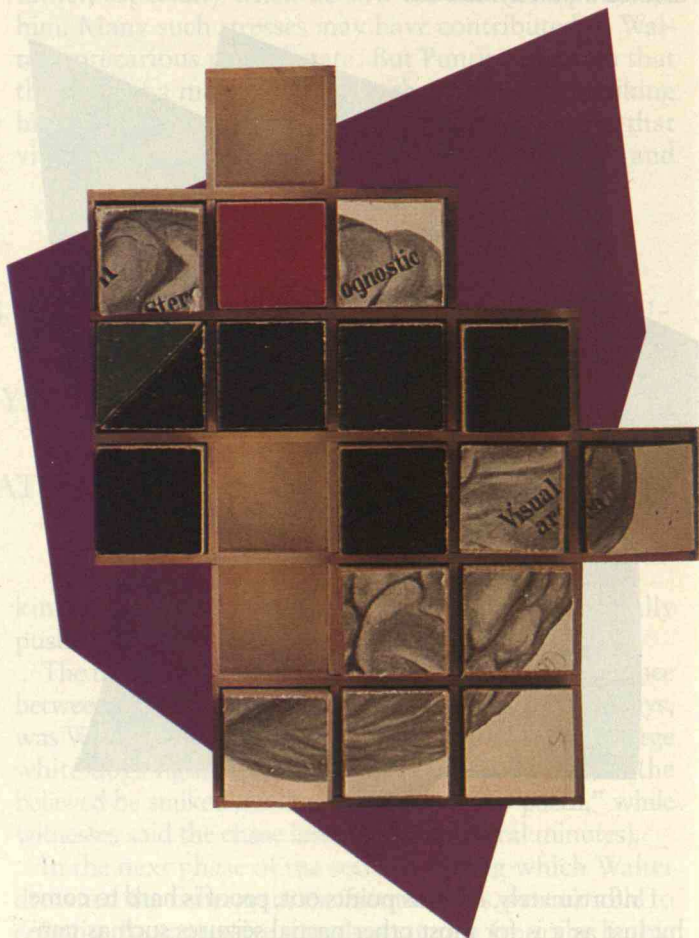
#### THE PAIN OF SEPARATION

Pontius stresses that not all loners are prone to committing violent acts or manifesting other uncontrolled limbic drives. In fact, unlike the extremely isolated subjects she has been studying, most lonely or shy people have at least one close friend or family member with whom to share thoughts and feelings about even normal stresses.

Jerome Kagan, a professor of psychology at Harvard and a prominent expert in shyness, is quick to agree. "Occasionally we get a shy person who loses it," he says. For instance, John Hinckley, the would-be assassin of President Reagan, was "a shy boy," as was Theodore Kaczyn-

ski, the suspected Unabomber. But most shy people obviously don't kill, he says. In fact, studies have shown that "the more shy you are, the less likely you are to do anything aggressive."

Nevertheless, one researcher who agrees that extreme social isolation has the power to trigger seizures is Paul MacLean, author of *The Triune Brain in Evolution*—a seminal work that explores how the human forebrain evolved and expanded to its great size while retaining an ancestral relationship to reptiles, early mammals, and late



mammals through the limbic system. "The worst thing that can happen to a mammal is separation," he says. "The need for socialization can probably be traced to the early evolution of mammals, when the nursing call developed—in the newest part of the limbic system, incidentally—to help prevent separation of mother and infant," explains MacLean, a senior research scientist in the National Institute of Mental Health and former head of the NIMH Laboratory of Brain Evolution and Behavior. He points out that only three things distinguish mammals from reptiles and other vertebrates: the development of nursing and maternal care, the vocal communication for maintaining maternal-offspring contact, and playful behavior. "When the very things that make us mammals, as opposed to birds or reptiles, are denied us," he says, "this can have devastating effects."



Pontius believes that in some cases severe limbic seizures might be prevented if social loners were provided with at least one friendly person to talk to, especially in their early years, perhaps by teachers who look out for very lonely children. They should have a steady friend they can trust, she says.

Trust is particularly vital during the first three to five years of life, says Pontius, who is also trained in child psychiatry. If it is not established or is broken through separation or loss during that time, "children can withdraw

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into themselves and never trust anyone again, ever." Psychotherapy later in life may only partially alleviate such lack of trust.

If parents cannot provide steady friendship, options for helping lonely children include finding other adults, such as scout leaders or participants in the Big Brother and Big Sister programs, or peers for them to talk to, Pontius says. Unfortunately, peers usually shun loners, which only makes matters worse, she says.

Recommending help for distrustful or otherwise troubled social loners is one aspect of Pontius's work about which most everyone agrees. But it's important to know the cause, says David Bear, professor of psychiatry at the University of Massachusetts Medical School. "With Pontius's patients, if you could get them to a therapist and let them start talking about this disturbing event and not

make it so private and mysterious, then catharsis, one of the oldest psychiatric tools, could work." With schizophrenics, he says, an antipsychotic medication might be appropriate in addition to some kind of supportive therapy.

In either case, Bear says it's important to stress that intervention is critical. Someone might be at risk of committing suicide or of becoming violent, even of committing multiple murders, he says, so the key is to open a channel of communication. As an example, he cites the case of John Salvi, who was convicted in March of killing two women at an abortion clinic in Brookline, Mass. "The only thing Salvi asked for was to get his statement out to the world about how Catholics are persecuted and how he has a scheme to prevent it," says Bear, who testified as an expert psychiatric witness for the defense in the trial. "If someone had talked to him or if he had gotten any psychiatric attention, then the whole thing might not have happened."

MacLean says intervention is also beneficial because it helps ease the pain of loneliness and separation, which creates the kind of tension that can trigger seizures. In fact, he recalls conducting trials of drugs to reduce epileptic seizures and finding that by "just sitting down and talking to the patients," both those in the control group and those treated with the new medication improved. "People have all this stuff going on internally that they are not aware of, and most doctors are not aware of, that can precipitate seizures."

Finally, some researchers, including Kenneth Blum, a professor of pharmacology at the University of Texas at San Antonio, who has reviewed Pontius's work, thinks that medications could be effective in treating limbic-seizure disorders. "We know that we can treat certain violent tendencies with an anticonvulsant drug called Carbamazepine, or Tegretol," he says.

#### ALTERNATIVE EXPLANATIONS

While Pontius vigorously defends her definition of a new syndrome and believes that reminders of even minor repetitive stresses can kindle psychotic limbic seizures, she is eager to explore theories about other possible engendering mechanisms. For example, she recently began collaborating with Blum, who has also been working with social loners suffering from aberrant behaviors that purportedly stem from limbic-system dysfunction. Blum believes he has found a genetic root to such problems—specifically, he claims to have discovered a genetic deficiency in a group of receptors that accept a chemical messenger called dopamine that elicits pleasant feelings in the limbic system.

Blum suggests that what Pontius is talking about are people who suffer from this so-called reward-deficiency syndrome. "Her limbic psychotic trigger mechanism is essentially the failure of the brain in these people to carry the proper genetic messages to allow them to feel good,"



he says. Without realizing why, they engage in dopamine-producing behaviors, such as sex or gambling, he says, while others go to the extreme of committing acts of violence and murder.

Pontius disagrees that her patients committed homicide for pleasure or for *any* purpose, and thinks that her patients and Blum's probably suffer from different types of limbic dysfunctions. Still, she is curious about the role of genetic factors in limbic-system dysfunctioning, as they may provide the hard physical evidence that her skeptics have been clamoring for. Indeed, Pontius has begun sending Blum DNA samples from her subjects so he can look for defects in the genes associated with the dopamine receptors.

Pontius is also in contact with Paul MacLean of NIMH, who believes that lesions in the limbic system may be responsible for aberrant behaviors. "I think there must be lesions of some kind in most of Pontius's cases; we just haven't seen them yet," says MacLean. He thinks such lesions could result from malformations that occur in the developing cortex before birth or soon after, or during the stress to the brain as the head passes through the birth canal. Other head traumas or even viral diseases could also cause lesions in the limbic system.

Pontius is eager to explore this theory as well, especially considering that about half of her patients reported they had suffered head injuries at some point in their lives. She also notes that animal research has shown that lesions or dysfunctions in the hippocampus, which is also in the limbic system, inhibit the ability to let go of old thought patterns or, more precisely, to learn new, more efficient ways to complete tasks. She is curious to learn whether such lesions might make it difficult for some people to put aside certain memories, which might trigger the bizarre behavior, or whether lesions may even cause someone to become a social outcast, which may lead to the same result.

It is not possible, of course, for Pontius to probe for lesions in her subjects. But in an attempt to gain some insight into the brain-lesion hypothesis, she plans to collaborate with Guy Pigeon, a doctor of veterinary medicine and director of research at the Animal Medical Center in New York City. At Pontius's suggestion, Pigeon's group will conduct postmortem examinations on a rare group of pet dogs who suddenly attack or kill their owners. She believes that because these animals are often isolated from normal socialization with a pack and from their owners for long periods at a time, they may be somewhat analogous to social loners who have succumbed to a limbic psychotic trigger reaction.

#### LEGAL IMPLICATIONS

Pontius continues to gather clinical documentation of both her syndrome and its suggested trigger largely through referrals from legal professionals in contact with people who commit emotionless, motiveless, unplanned felonies

during a brief psychosis. In fact, since reports of her work have begun to appear in both the professional and popular press, she has received numerous calls and letters about other possible cases from defense attorneys who believe their clients might have had limbic seizures. "I read your article," one public defender told Pontius. "We have 50 people on death row, and several of them might fit your description."

That Pontius's syndrome could be used as a new legal defense is exactly what frightens some observers. In fact, it has been successful in all but one of the cases where it has been employed, at least in getting patients sent to maximum-security hospitals rather than to prison. "The first time I read about this limbic-seizure disorders theory, I thought, 'Oh my God, somebody could go out and kill people serially and use this as a defense to get away with it,'" says Jarrod Barnhill, a psychiatrist at the University of North Carolina who reviewed Pontius's theory before it appeared in the *Bulletin of the American Academy of Psychiatry and Law*.

Ralph Slovenko, a professor of law and psychiatry at Wayne State University who finds Pontius's theory convincing, likewise fears that one of the "hazards of the biological approach is that an overly aggressive lawyer might use it as a last-ditch defense." For example, in the trial of John Hinckley, the defense was able to introduce a CT scan of Hinckley's brain, he says. "The CT scan doesn't meet the test of scientific reliability in court, and it showed some abnormality that you could find on almost anybody," he says. "But they found him not guilty by reason of insanity."

It might seem that the limbic psychotic trigger reaction could be similarly used. After all, since there's no physical proof of the disorder, couldn't someone who committed a grisly murder simply fake having had a limbic seizure? If a person claimed he had experienced hallucinations just prior to his homicidal attack, that he hadn't really tried to conceal the crime, that he did indeed feel remorse, how would we know if he were telling the truth?

Pontius isn't worried. "With a dozen symptoms each present in all my cases so far, faking is very difficult," she says. For instance, if someone falsely claims there was no motive or planning, that is easily disproved by the evidence. "Frequently, there are witnesses, because a seizure is never planned or under volitional control," she says, "and witnesses can observe the absence of emotion during the irrational act or see behavior with visceral symptoms—or the police see it in the underwear." Finally, she says, the perpetrators assume full responsibility, do not blame anybody but themselves, and virtually ask to be punished. If not, they may try suicide or they may plead guilty even before their case is presented at trial."

Judge William Nicholas, a family court judge in Kent County, Del., and formerly a defense attorney in one of Pontius's cases that did go to trial, also sees no danger that this defense could be misused. "It would be pretty hard to



fool anybody with this sort of defense unless it were true," he says, "and even then it would be a difficult sell." In fact, Nicholas finds that mental-illness defenses in general are usually a last resort and not particularly persuasive to juries.

Some observers share Pontius's view: that fears about freeing the guilty are misplaced, and that society should rather be more concerned about providing appropriate detention or treatment of those in prison or on death row who truly were not responsible for their actions. "The greater danger is that we wind up punishing people who could not control their actions," says James Hannon, associate professor of sociology and director of the graduate program in Criminal Justice at Suffolk University in Boston.

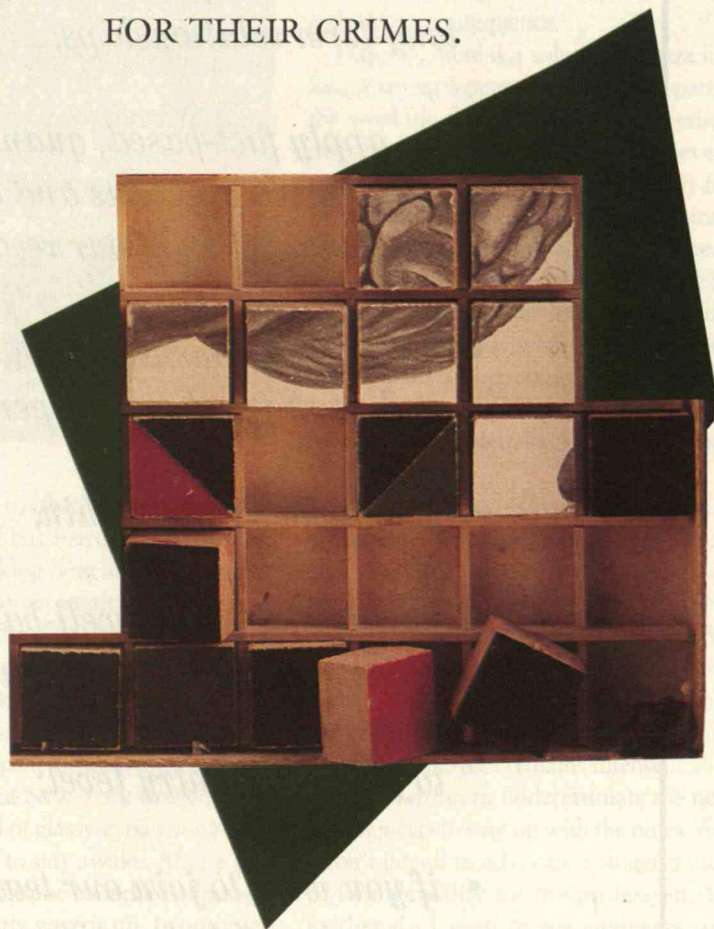
No one can estimate at this point how many people might have suffered from limbic seizures, only to be judged as being responsible for a crime. But Hannon, who finds the evidence for limbic seizure disorder syndrome "very strong," believes the number could be significant. "We have 1.4 million people behind bars in America, and even if limbic seizure disorders are responsible for one-tenth of 1 percent of all crimes, that's 1,400 people," he says. Moreover, he says, that percentage represents the entire prison population. He estimates that it could be much higher for people who have committed murder, many of whom may be on death row, and for those who have attempted murder.

Of the 25,000 homicides committed each year, about 10 percent are unexplained, irrational killings of complete strangers, Hannon says. He estimates that about 10 percent of those, or some 250 in all, could be attributed to limbic seizure disorders. He also thinks that the number of people suffering from limbic seizure disorders who have *attempted* murder may be at least three or four times the number who have actually completed a homicidal act. After all, he says, because these attacks are unplanned, they probably do not involve the use of firearms and are committed in public, so victims can often defend themselves, or bystanders can come to their rescue.

Hannon agrees, however, that a limbic-seizure defense or other insanity defenses, even when used appropriately, tend to fall on deaf ears. The reason, he believes, is that our criminal justice system has become increasingly "retributive"—the courts pass a sentence not as a deterrent but to punish someone. But what happens, he asks, if we discover that the aggression of many of these murderers is due to a brain dysfunction that could be treated or cured, and that a murderer could be rehabilitated? "We sacrifice the offender whether he is damaged or not in order to fulfill the social function," he says, "which

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RITICS FEAR THAT  
THE SYNDROME  
MIGHT BE USED  
INAPPROPRIATELY TO HELP  
FREE MURDERERS WHO  
TRULY ARE RESPONSIBLE  
FOR THEIR CRIMES.



is to preserve a sense of an ordered world and of our ability to safeguard ourselves, and to support our belief that individuals are responsible for all of life's outcomes." But research such as Pontius's may eventually reveal that individuals are often not fully responsible for all outcomes, and "the attempts to punish or execute them for sociological reasons will look increasingly foolish and unjust," he says. "That is why her work is so important." ■



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# Lifelong What?

*Prevailing wisdom says that professional survival requires engineers to scramble along a treadmill of perpetual training. But there is a sensible—and less stressful—alternative.*



SAMUEL C. FLORMAN

Amid widely publicized layoffs, a new theme is reverberating through the engineering profession: lifelong learning. Heralded as the antidote to much-dreaded obsolescence, lifelong learning has become, among engineers, a credo for survival. "Continuing education," of course, has been around for a long time, but the term today seems pallid, not equal to the crisis mood that has lately gripped the profession amid widely publicized layoffs. A set of guidelines issued last year by the Accreditation Board for Engineering and Technology, for example, urges "recognition of the need for, and an ability to engage in, lifelong learning." A report from the Engineering Deans Council and the Corporate Roundtable of the American Society for Engineering Education says students must be told that "career-long learning is their own responsibility." Since the mid-1980s, dozens of similar reports have preached essentially the same sermon.

Out in the marketplace, the message becomes even more fervent. An adviser on employment and education at the Institute of Electrical and Electronic Engineers exhorts engineers to commit proportionately as much time and money to maintaining and enhancing their professional advancement as they spend on maintaining and improving that other critical investment, their house.

There is a compelling argument, to be sure, for keeping up with developments that affect one's profession. Yet the lifelong learning proposition kindles in my imagination a scenario worthy of a television sitcom: engineer rushes home after a hard day's work, mows the lawn and paints the porch, hurries off to attend a class, returns to cook dinner, fixes a leaky faucet, checks the Internet for e-mail from colleagues around the world, and finally falls asleep doing homework. Add in some hurried conversation with spouse and children, and you have the makings of classic farce.

Except that it isn't funny. The difficulties of life in high-stress, high-tech places like Silicon Valley—including elevated divorce rates—are well documented. What will be the consequence of adding hours of techni-

cal education to the already pressure-packed days of hard-working engineers? We are not talking here about a concentrated effort to attain a particular degree, as hallowed in the American folklore of getting ahead. No, this is a lifetime commitment.

When I think back to my own experience with learning while I worked—two nights a week spent at the (long-vanished) Bronx campus of New York University—I recall a roomful of glassy-eyed young engineers struggling to stay awake. After a year of what I found to be an exhausting regimen, I reluctantly gave it up. I continued to work hard at my job, and to learn as much as possible from my elders. But as for classes after sundown—well, I thought it was more important, in today's vernacular, to get a life.

Is it possible to devote ever more time to technical education without restricting engineers to a precariously narrow range of per-

sonal experience? I think not. Most engineering schools, under pressure to keep up with rapidly evolving technologies, have all but eliminated liberal arts from the curriculum. By carrying this pattern over into adult working life we make it almost impossible for engineers to attend cultural events, participate in community activities, spend time with family and friends—in short, to realize their full potentials as human beings. The CEO of a major high-tech firm, who has opined that literature, history, and art should not be taught to engineering undergraduates but rather pursued as personal interests, at the same time advises his engineering employees to engage in lifelong technical learning. Lifelong provincialism is the likely consequence.

Happily, there is a solution. Where lifelong learning is pursued routinely as part of the working day, the engineer's predicament suddenly disappears. Indeed, several corporations have created wonderfully far-sighted and effective policies to encourage on-the-job professional development. Xerox, for example, has an intensive in-house training program and also subsidizes some outside study with both tuition aid and time off. Other companies known for enlightened practices include Intel, Motorola, Hewlett-Packard, and Texas Instruments.

Unfortunately, smaller companies, where long working hours are the norm and fanatical efforts are made to keep overhead low, often perceive education programs as luxuries they cannot afford. We must hope that, as they mature, these companies will temper their harsh and short-sighted views. But for now, the pressure on their employees remains intense.

I don't mean to underestimate the need for engineers to stay up with the times. And I don't intend to advocate a sluggish nine-to-five mentality for the profession. Yet neither do I wish to see engineers turn themselves into overstressed specialists. Unless "lifelong learning" embraces the concept of examining one's own way of life, it might do more harm than good. ■

SAMUEL C. FLORMAN is a civil engineer. His latest book, *The Introspective Engineer*, was published in March by St. Martin's Press.



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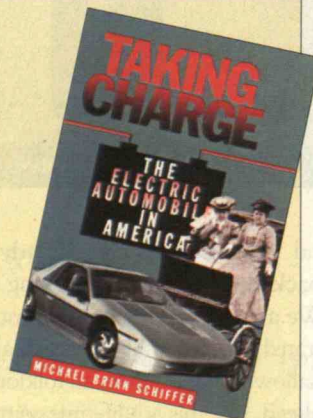
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## LETTERS

CONTINUED FROM PAGE 10



### OVERSTATED PAYBACK

In "Building a Better Economy: An Interview with Lester Thurow" (*TR May/June 1996*), Thurow misleadingly claims, "Retired individuals get back all the money they paid into the Social Security system plus interest in less than four years. After this, they're essentially on welfare." Something is wrong with this statement, considering that the first dollar I paid into Social Security bought thirty-three first-class stamps plus a penny stamp, yet that same dollar, which Social Security is now returning to me, can purchase only three first-class stamps plus a penny stamp.

When I began my Social Security contributions, the federal government promised a tax-free income upon retirement and even urged additional contributions for a higher retirement fund. This promise was kept until the mid-1980s, at which time half of my Social Security income began to be taxed. Now eighty-five percent of that income is being taxed—despite the fact that half of my payments into Social Security were made after taxes and at much higher marginal rates than the current twenty-eight percent.

With no allowance for inflation or interest, it will take four years to get my Social Security contributions back. Allowing for three percent interest and inflation, it would take more than eighteen years of payments to recoup my contributions.

JOHN KENNETH HAVILAND  
Earlsville, Va.

Thurow has considered only living retirees. An appreciable percentage of this age group has died, leaving their survivors well short of the largesse Thurow describes. Such omissions leave him well short of serious mavenhood.

JOSEPH IRGON  
Flanders, N.J.

Continued on page 73



# The Importance of Being Complementary

*Investment  
in technology really  
does pay off in produc-  
tivity gains—but only  
if government and  
industry set the stage.*



BENNETT HARRISON

**N**O subject has been more salient in the 1996 presidential election than the connection between stagnation in the average standard of living, the rise in income inequality, and the slowdown in long-run economic growth. But can the economy tolerate more rapid growth without incurring ruinous inflation? Just what is it that makes an economy grow, anyway? In particular, what have we learned about the special roles of innovation and technological change in furthering economic growth?

In June, the Federal Reserve Bank of Boston brought together historians and economists at a Cape Cod resort to compare notes on these questions and share their thinking with the architects of national monetary policy, including Fed chair Alan Greenspan and members of the president's Council of Economic Advisers. The Fed wanted to tap the latest wisdom about how innovation and investment in new technologies affect the rate of economic growth, and why they—and we—should care.

Growth will not cure all the economy's ills, but it can certainly help. Faster growth could, for example, make efforts to redistribute some of the nation's wealth more politically palatable. But as growth takes off, labor markets tighten in particular occupations and locales, so pressure builds on employers to raise wages. To the extent that companies pass along these increases to customers in the form of higher prices, inflation will accelerate. This is why Wall Street has become so jittery of late over every sign of declining unemployment.

But inflation is not inevitable. If productivity—the output produced per worker—goes up along with wages, we can have our cake and eat it too. During periods of growth, customers spend more, and there are more employed customers to do the spending, so corporate profits rise. The expectation of rising profitability induces additional investments in R&D, as well as spending on plant and equipment embodying newer and more productive technologies—from fiber-optic cable and point-of-sale inventory controls to medical and industrial lasers and companies' internal computer networks. Over time, these investments further propel growth. It is a

classic case of a virtuous circle.

Given the almost universal consensus among economists that investments in new technology can boost productivity and growth—and, therefore, the average standard of living—why has this connection been so hard to observe in real life? Why, in the words of MIT's Robert Solow, does the application of computers to an ever-wider range of uses “show up everywhere but in the productivity numbers?”

The answer from the scholars on the Cape centered on a notion now hotly discussed by economists, called “complementarity.” Simply put, investments in production technologies cannot achieve their potential without a number of concurrent developments. These might include the introduction of more flexible workplace organizations, the delegation of greater responsibility to nonmanagerial labor, the enhancement of skills among both managers and their employees, and the installation of new infrastructure, ranging from Internet connections to new-fashioned airports to “smart,” energy-efficient buildings. Fresh research from a growing num-

ber of experts—including Columbia's Frank Lichtenberg, MIT's Eric Brinjolffson, and Carnegie Mellon's Maryellen Kelley—shows that when such complementary factors are accounted for, investments in information technology *do* stimulate productivity and growth.

So, asked the federal officials, if investments in R&D, computing, and innovative practices do yield a long-term payoff, after all, what, if anything, can public policy do to promote these developments? This was not a group enamored of governmental intervention. Still, acceptance of the principle of complementarity means that government should put more money into training as a way to help realize the potential productivity benefits from new technology. A comprehensive upgrading of the nation's infrastructure is called for. And a few participants were even encouraged by the potential of such national initiatives as the Technology Reinvestment Program, which, by awarding some R&D grants only to teams of firms and local governments, promotes collaboration that might enhance the productivity benefits from innovative R&D beyond what individual companies could achieve by operating at arm's length from one another. Macroeconomic policy (and posture) aimed at inducing the bond markets to lower long-term interest rates can help only by reducing the cost of capital.

Perhaps the real significance of the Boston Fed's June retreat is that the gathering took place at all. After years of economists' blaming stagnating wages and rising income inequality on inadequate schooling and actual or potential foreign competition, economists and policymakers are focusing their attention on the problem of slow economic growth and its complex relationship to technological and organizational innovation. That development is bringing researchers and government officials of vastly different persuasions and specialties under the same tent—or at least into discussion around the same campfire. ■

BENNETT HARRISON is professor of political economy at the New School for Social Research's Milano Graduate School of Management and Urban Policy in New York.



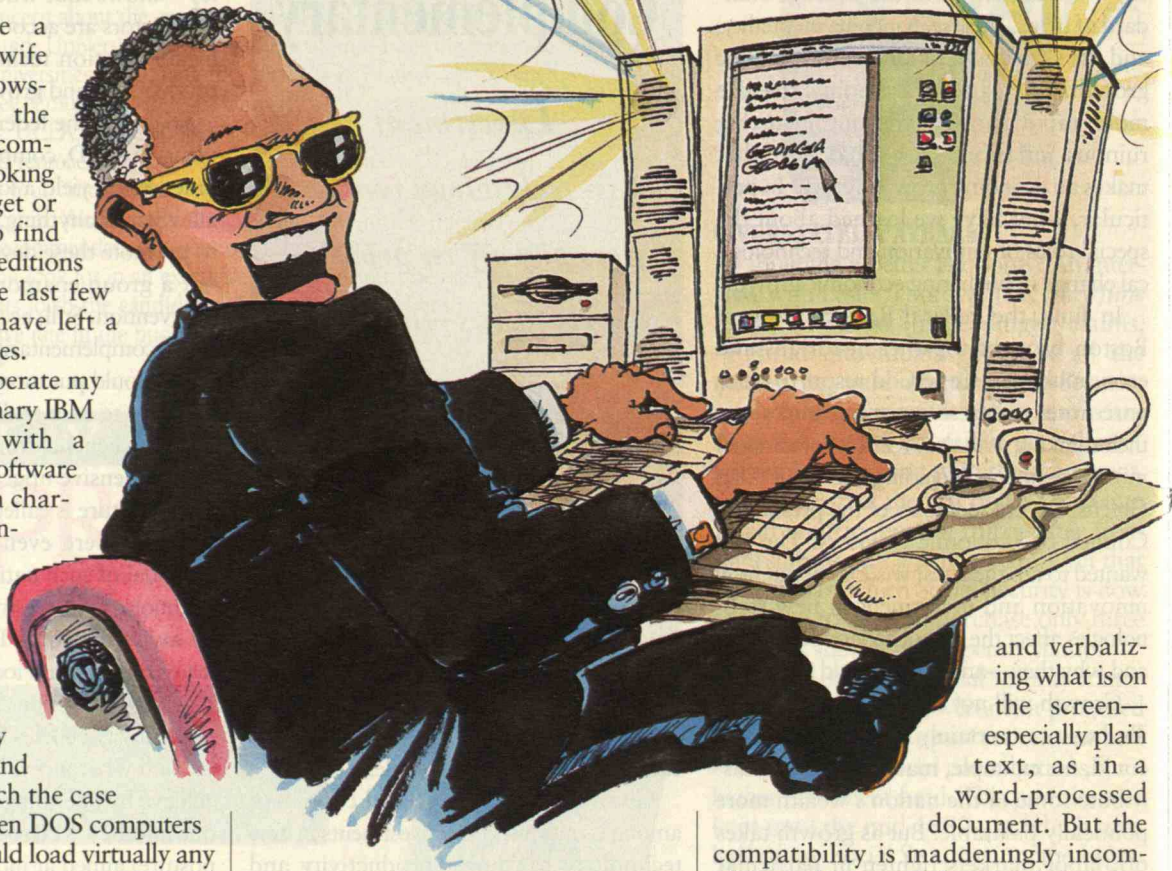
# Toward Software Both Seen and Heard

**A**BOUT once a month, my wife and I go browsing among the racks at our local computer superstore, looking for some new gadget or software. I used to find these shopping expeditions productive, but the last few trips to the store have left a cold chill in my bones.

I am blind. To operate my computer—an ordinary IBM PC clone, fitted with a speech generator—software must verbalize each character I type and identify each object that the mouse or cursor lands upon. In a perfect world, the vocal output of the computer would closely reflect my actions. And that was pretty much the case back in the days when DOS computers ruled the roost. I could load virtually any piece of DOS software onto my PC and be confident that my screen reader would reliably vocalize everything on the screen—not only text that I was writing and editing but also the menu items, dialogue boxes, and warning messages.

Those days are gone. DOS may have seemed unfriendly to sighted users, but it was well suited to the blind. DOS is a text-based operating system; everything that appears on the screen is constructed from a few hundred well-defined characters. Moreover, DOS always keeps in its memory a copy of all the information that the screen is displaying. Screen readers and other adaptive devices can easily read this “text buffer,” and thus convert to speech any object on the screen.

But virtually all PC software now is written for graphical user interfaces such as Windows, OS/2, and the Macintosh. These systems, which paint the screen pixel by pixel rather than character-by-character, display layers of windows, menus, icons, and dialogue boxes. Like



*Blind people have been left out in the cold as computers have turned from text to graphics. To surmount the problem, software companies need to build in accessibility from the ground up.*

the vast majority of computer users, I have migrated from DOS to Windows—and, like many other blind people, I am finding that operating a computer has become far more difficult.

For several years after Windows became popular, there was no Windows-based screen-reader software at all on the market. Such products now exist, and do a fair job of recognizing

and verbalizing what is on the screen—especially plain text, as in a word-processed document. But the

compatibility is maddeningly incomplete, and many of the visual elements that have become integral to using a PC—such as check boxes and control panels, often with meaningful variation in color—produce erratic spoken results.

In principle, software that runs under Windows is supposed to adhere to a set of standard rules called the Application Programming Interface (API). But programmers, motivated sometimes by aesthetic concerns and sometimes by the desire to build a better mousetrap, often stray beyond the boundaries of the API and concoct their own schemes to generate these graphical elements. Unfortunately, deviation from the standard renders the information invisible to the software that acts as my eyes.

Consider a typical session at the PC. As I move the cursor around the screen, the reader provides a running commentary on my actions—words I've typed or highlighted, menu choices I've clicked on. Most of the time the machinelike voice gets it right. But because Windows



lacks the equivalent of the DOS text buffer, there is no guaranteed way for the screen reader to know what is being displayed, and it sometimes behaves as if it is unaware of my editing—for example, speaking aloud words that I have already deleted. Worse, I'm often confronted with unexplained and unpredictable silences. A sighted person at my elbow has to inform me that the computer is telling me it can't find a file, or that a menu item I've attempted to select happens to be dimmed—the (visual) cue that this choice is unavailable. My computer tells me nothing because the programmer neglected to make sure that information about the status of menu items—for example, whether they are selectable—would be available to the screen reader.

Such mistakes are common enough that the most reliable way for a blind person to use a Windows computer right now is to “make sure there's a sighted person not more than 20 feet away to help when things go haywire,” says Douglas Wakefield, a specialist in assistive computer technology at the federal General Services Administration. That's hardly a recipe for independence. Some blind Windows users have even reverted to using programs that run under the older DOS operating system in order to remain competitive in their jobs. Daniel King, a physician at the Veterans Administration medical center in Boston, tried for several months to use the screen reader that his office provided on its network of Windows computers. “Some things worked and some things didn't,” he reports. King says he is giving up on Windows until improvements are made—a withdrawal from the mainstream of his office that will in a small way reinforce the sense of isolation that many blind people feel so acutely anyway.

Dana Millar, coordinator of the visual impairment services team for the Department of Veterans Affairs, says he gets a “near constant stream of complaints from blind people in the workplace” trying to run computers with graphical interfaces. Although Windows is the most common graphical operat-

ing system, it is not the only offender. The Apple Macintosh, which was originally highly accessible to the disabled, lost that distinction with the introduction of System 7 several years ago. The new system led to a proliferation of non-standard programming techniques that confuses some screen-reading software. “It's sad to see qualified people turned down for positions just because a piece of software won't talk,” says Terri O'Shea, employment development specialist for the Resource Partnership of Boston, which helps find jobs for people with disabilities.

### Not Necessarily Expensive

Most of the difficulties would disappear if software developers adhered to a common set of standards in writing the programs that create the graphical interfaces for their products.

Microsoft, the creator of Windows, has considerable power to improve this situation, and is at least saying some of the right things. The company maintains it will include in future versions of its operating system support for an “off-screen-model” (OSM)—a database of the computer screen's entire contents, including text and graphics. Screen-reading software will be able to query the OSM to determine exactly what is present on the screen at any time, and then speak that information aloud or send it to a Braille output device.

By building the OSM into Windows, Microsoft will simplify the task of applications software companies that wish to make their products (word processors, spreadsheets, Web browsers, and so on) accessible to the blind. So far, however, despite a year of promises, the OSM has not materialized in new versions of Windows.

Several factors are holding back the provision of full access to the blind in software. One is that software developers tend to resist the standardization that screen readers require, viewing the demands of providing disability access as one more constraint that complicates the already difficult job of creating soft-

ware. Microsoft, to its credit, has begun to evangelize among applications developers that the provision of access need not cramp the style of the software.

And acknowledging the reluctance of applications programmers to stick to the APIs, Microsoft has developed and is distributing a set of programming tools that software developers can use to ensure that screen readers are not left in the dark even if a product includes some nonstandard controls. Microsoft is also beginning to use these techniques in some of its own applications, including the Internet Explorer and Microsoft Office.

Another barrier is the mistaken belief that software fully usable by the disabled has to be expensive. This may be true if access is an afterthought. It is not difficult, for example, for the creators of a word processor to write the program so that the output of every keystroke gets directed not only to the screen but also to a part of the computer that would be sensed by a screen reader. But if such coding is neglected at the outset, it could be quite a struggle to retrofit this feature—not unlike adding wiring to a house after the plaster has dried. To make sure that important features do not get overlooked, software companies ought to consult disabled volunteers when planning and testing new products.

Providing access to the blind is not a matter of mere charity. As the population ages, blind people will account for a growing portion of the computer-buying public. And state and federal agencies, libraries, schools, and colleges, all under federal mandate to provide accessible environments, will prefer and even require accessible software. Computers equipped with adaptive technology permit individuals with disabilities to pursue independence in the home, school, and workplace, helping them become productive citizens. ■

JOSEPH J. LAZZARO is director of the Adaptive Technology Program of the Massachusetts Commission for the Blind. He is the author of *Adapting PCs for Disabilities* (Addison Wesley, 1996). His e-mail address is lazzaro@world.std.com.



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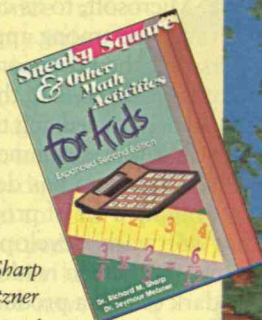
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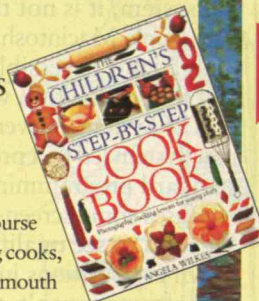


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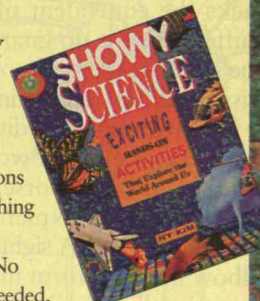
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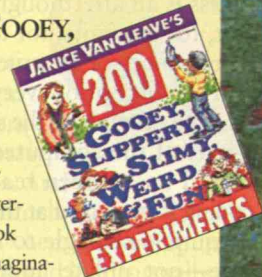


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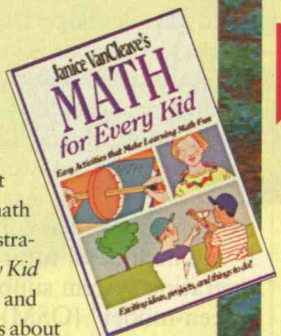


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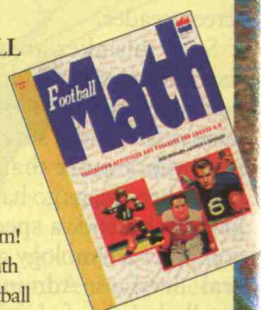
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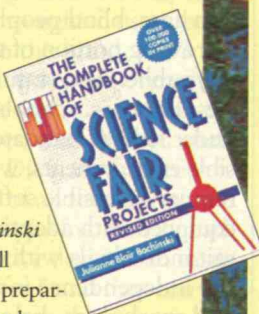
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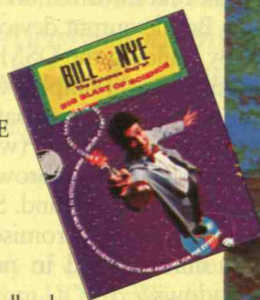
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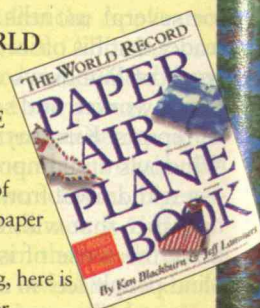
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# Reviews

## BOOKS

### A PARTICULARLY THOUGHTFUL STUDENT ACTIVISM

*Generation at the Crossroads: Apathy and  
Action on the American Campus*  
by Paul Rogat Loeb  
Rutgers University Press, \$16.95

BY SANDRA HACKMAN

IN 1970, sparked by major demonstrations on college campuses, our middle-class New Jersey town mobilized against the Vietnam War. Mothers, fathers, and children gathered to march one sunny Sunday in a solemn yet proud procession. Today's college students, in contrast to those who so inspired our public protest, supposedly evince little interest in politics, and the rest of us seem to have followed suit. Even the simple act of breaking stride to converse with an earnest adherent of a cause can seem like an act of courage, requiring us to fend off the studied indifference and skepticism of those who brush on by.

In *Generation at the Crossroads: Apathy and Action on the American Campus*, journalist Paul Rogat Loeb investigates students' real attitudes toward political engagement. Encountering hundreds of young adults during a seven-year journey among campuses nationwide, he discovers that they are a far more complex group than their stereotypes would suggest.

Students often do express profound reluctance to devote time and energy to political causes, he concedes, but their reluctance stems less from general apathy than from a welter of other problems. One of the biggest is a tightening vise of economic pressure. Most of the young adults Loeb has talked to must juggle classes with half- or full-time jobs,

and nevertheless face the prospect of paying off loans for the foreseeable future. Worse still, the financial outlook for that future is uncertain, even with a degree, so that worrying about the welfare of others can seem like a dangerous distraction.

Another difficulty is that feelings of powerlessness weigh heavily among young people who might otherwise be politically active. "My teachers have always said this is a government run by the people," says one woman. "Yet everyone I know says 'You can't do anything. The government will make its decision. You don't have a say.'" Cyni-

homeless to working for a cleaner environment. Still, some find the worthwhile to overcome the considerable barriers. According to Loeb, what distinguishes those students from their peers is a personal identification with the needs of others, and a solid understanding of the threats to the health of their own communities.

One such student, Barb Meister, became a leader in a movement to save small farms when her family's Nebraska homestead faced foreclosure. A rally of similarly threatened citizens from 14 states changed her world view dramatically, prompting her to link her family's



cism also pervades students' outlook. Many dismiss those who take public stands as imitation sixties types seeking attention. And students tend to equate political involvement with hate and divisiveness as well. Even activist students cite the "spitting on soldiers" supposedly favored by protesters against the Vietnam War. Interestingly, however, Loeb could find no veterans of the Vietnam era, either soldiers or antiwar protesters, who can recall a single such incident.

Finally, students who want to support social causes are often vexed by the difficulty of choosing among an overwhelming number of them, from improving race relations to helping the

problems to provisions in the 1985 federal farm bill that had encouraged overproduction and subsidized giant feedlots at the expense of small landholders. In response, Meister started a campus organization that challenged her major Midwest university to develop alternatives for declining rural communities rather than simply pursuing research on chemical-intensive agriculture.

Loeb also recounts the efforts of students on 14 campuses of the State University of New York in 1991 to reverse steep tuition hikes that might have forced thousands to leave school. Seeing their actions as a last-ditch stand against a lifetime of checking groceries or working in fast-food joints, these stu-



dents occupied administration buildings, organized rallies, and called for a boycott of classes. And their strategies clearly show that they were connecting their own needs with those of others. Convinced that attracting a wide range of supporters from the community as well as from campus would prove critical to success, they worked to couch their message in terms of the general threats to jobs and neighborhoods engendered by cuts in the state budget.

### Challenging the "Politics of Austerity"

Probing deeper into his subject, Loeb notes that while modern technologies can foster political engagement in young people, they can also stymie it. TV is a salient example. Although the medium can provide the personal link to people and events that elicits action, it often conveys a disaster-oriented take on the world's problems without providing any sense of how to deal with them. Among students who watched six hours or more of TV a week, Loeb discovered none who were politically engaged.

The Internet, touted as the tool whereby citizens can take direct action to shape society, is a mixed bag, too. Activists of many different stripes are indeed finding it indispensable. For instance, students organizing protests against recent moves in the House of Representatives to slash undergraduate and graduate financial aid relied on e-mail in deciding on everything from when and where they should meet to what their political message should be. They gained instant electronic access to the text of pending legislation as well. Yet the Net poses its own dilemmas, as mail containing reams of facts and figures and demanding urgent action piles up and induces the numbness that precedes paralysis.

The forces that consistently do facilitate activism tend to have nothing much to do with technology at all. Loeb reports that many students, including Barb Meister, are inspired by family members strongly commit-

ted to civic responsibility. Contact with professors who encourage students to study history and debate policy also motivates many students to try to respond to pressing social needs. Professors so inclined are rare, Loeb finds, thanks perhaps to universities' growing reliance on part-time and untenured faculty, whose lack of job security may make them hesitate to encourage political discussion. But the impact of concerned teachers can be powerful.

One reason why actual human contact has been so much more important than telecommunications in furthering political engagement among students may be that computer networks alone cannot encourage the kind of thinking necessary to challenge what Loeb calls the "politics of austerity"—the mentality that says we must choose between supposed luxuries like affordable tuition and universal health care. Such a mentality falsely limits the terms of any debate, he points out: society's overall wealth happens to be growing, even if individual bank accounts are not. Yet instilling an awareness of this reality may prove formidable, since the tendency to equate one's own means or lack thereof with society's is deeply ingrained, and widely reinforced by powerful political actors. Indeed, successful citizen efforts to expand the range of policy options usually occur during times of rising incomes and expectations, when helping some needy groups does not seem to require hurting others.

While Loeb is to be commended for his insight and thorough research, he may be setting too much store by student activism. His model, which appears to derive from the youth-led protests of the last generation, may not hold in the future. As a matter of fact, it might not even reflect much of the past. In the 1930s, for example, it was working-class union members who were key, joining with progressive intellectuals to fight for economic reforms such as Medicare and Medicaid and the fundamental right to a

decent income. On the other hand, the author is entirely justified in drawing inspiration from those nineties students who find it in themselves to embrace social causes. Possibly because the political understanding that informs their actions is so hard to come by these days, they are a particularly thoughtful breed. As Sonia Tinsley, an activist at Emory University in Atlanta, attests, she does not want simply to be "caught up in a cycle of reacting, going to marches, holding up signs, and shouting . . . I want the marches to be part of something else, something substantial in terms of building alternatives and solutions." ■

SANDRA HACKMAN is the managing editor of Technology Review.

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## BOOKS

## ENLIVENING A "DULL" DISCIPLINE

*Blondes in Venetian Paintings, the Nine-Banded Armadillo, and Other Essays in Biochemistry*

by Konrad Bloch  
Yale University Press, \$30

BY ROBERT J. CRAWFORD

HIGH-SCHOOL chemistry, for me, was collapsed into a single summer course. In a series of canned experiments, I learned that atoms fit into molecules like a Tinker-Toy puzzle; that the shape of molecules, from the twin spirals of DNA to the Mickey Mouse ears of water, determines their behavior; that formulas with arrows can express the exchange of atoms in chemical reactions. The rest was detail, and I dutifully ground through the math and memorized chunks of the periodic table for my grade. Not even my colorful instructor, who once exploded a beaker to demonstrate a "quick" chemical reaction, could relieve the tedium.

The popular conception of chemistry remains stuck in this sort of experience. In contrast to disciplines like cosmology, with its "ultimate" questions, chemistry, we assume, is essentially solved, requiring only a little fine-tuning by researchers toiling in obscure laboratories. But in *Blondes in Venetian Paintings*, Konrad Bloch, a Nobel laureate in medicine and physiology at Harvard, sets out to change that impression, at least with regard to the large subdiscipline of biochemistry.

The story of biochemistry, as he tells it, is full of riddles and surprises. And it is not even particularly old, beginning a little less than a century ago, in 1897, when Eduard Buchner ground up yeast cells with sand, put them in a bottle, plugged it, and woke up the next day to

find that the cork had popped. This event overturned the long-held "vitalist" notion that the processes of life could operate only in intact, living cells. It proved, instead, that cell physiology could be studied as purely chemical reactions. The next 50 years, which Bloch describes as the golden age of biochem-

scurvy and remedied by a diet of fresh fruit and vegetables; beriberi, once common in East Asia, is now known to be related to the low thiamine content of the region's staple food, rice.

Bloch uses science's knowledge of nutritional requirements to make some novel extrapolations. One of these is the



istry, brought the discovery of the enzymes and other molecules behind innumerable physiological processes, and the methods scientists used to obtain this knowledge were similar to those of Buchner: grind up cells to free their chemical constituents, and then attempt to predict the behavior of those chemicals under a variety of conditions.

### Novel Extrapolations

Among the more notable repercussions of these experiments was a developing science of nutrition. "The prerequisite for this achievement," Bloch writes, "was to isolate, purify, and establish the [molecular] structure of the . . . essential amino acids, essential fatty acids, and vitamins." Once these building blocks were identified, researchers could experiment to determine the amounts and combinations that would lead to better health. A lack of ascorbic acid, for instance, was fingered as the cause of

idea that because the domestic cat cannot by itself produce the amino acid taurine, it has remained an aggressive predator of the birds and fish that can. If cats were deprived of their prey, the retinas of their eyes would deteriorate, eventually inducing blindness. Carnivorous fishes, the author believes, are driven by a similar need to exploit the naturally manufactured fats in their victims.

The pathways of intercellular communication—the receptors that allow cells to cooperate in forming tissues and performing a variety of other vital tasks—are another area that has seen fervent exploration by biochemists. The structure of such receptors determines which hormones and chemical mediators bind to a site, thus activating the enzymes that initiate biological functions, and Bloch suggests that these receptors may often play an important role in human behavior as well.

However, just because biochemists have located certain receptors and iso-



lated certain molecules doesn't mean anyone knows how they work in precise detail. And this holds true for both new discoveries and old ones. Consider the blood sugar trehalose, which protects insects against unusual environmental stresses, including freezing temperatures as well as desiccation. As Bloch points out, the chemical mechanisms that allow for such protection are an enigma that not even state-of-the-art techniques can penetrate.

These are just a few of the threads that run through Bloch's book. His essays cover an extraordinary range of subjects. From the evidence in paintings and engravings and a few ancient treatises, for instance, he deduces the chemical methods Renaissance Italian women used to bleach their hair—the key may have been a soap-based hydrogen peroxide combined with exposure to sunlight. Other engrossing passages examine the reasons why armadillos are ideal subjects for studying certain ailments. Leprosy is one: the animals' low body temperature permits the disease to develop easily, as it does in the cooler human extremities. Armadillos are also one of the few mammals affected by thalidomide, making them more valuable than lab mice for research on the genetic deformations the drug causes.

The overall effect of *Blondes in Venetian Paintings* is to produce a fascinating and personal view of a field the author has helped shape. Although Bloch occasionally falls into heavy scientific jargon, what he has to say deserves careful study. Fortunately, too, the work adds to a string of excellent chemistry books recently published for a popular audience, including *The Same and Not the Same* by Roald Hoffman, and *Designing the Molecular World* by Philip Ball. With any luck these passionate, often poetic introductions to the "dull" discipline will inspire widespread interest in the intricate science of how molecules function. ■

ROBERT J. CRAWFORD is a research associate at Harvard Business School and a freelance writer focusing on issues in science and technology.

### A LAX TAX

In "The Great Internet Tax Drain" (*TR* May/June 1996), Nathan Newman asserts that online retailing poses a threat to the sales-tax proceeds of municipalities and states, even though commercial transactions on the Internet total only \$200 million a year—one-ten-thousandth of all U.S. retail trade. Although Internet commerce



will grow, it will have to be 1,000 times greater than it is now to account for a 10 percent drop in trade from other sources. How many of us will buy cars, appliances, and restaurant meals over the Internet?

MICHAEL TOWNSEND  
Hillsboro, Ore.

Having recently sorted through a year's worth of credit-card receipts, I can assure you that contrary to Newman's assertion that no state has "dared" to enact a "use tax," Virginia is collecting 4.5 percent on goods purchased out of state. However, enforcement of the tax is so lax as to essentially render it voluntary.

Nevertheless, I would not be surprised to learn that other states are following suit. Even a "voluntary" tax backed by the force of the law is sure to garner enough revenue from honest citizens to more than offset the cost of its administration—a prospect that must look tempting to state legislators everywhere.

MARILYN L. PIFER  
Alexandria, Va.

### The author replies:

Readers from Michigan, Connecticut, and Rhode Island have also notified *TR* that they are paying a state tax on goods purchased out of state. However, no state has imposed measures such as audits of credit-card or checking-account records. Without such enforcement, any use tax is as toothless as an income tax without W-2 forms or the threat of IRS audits.

### LIGHT AND SHADOWS

In John Dillon's "Keeping the Lights On, Market Style" (*Trends*, *TR* May/June 1996), Stephen R. Connors, director of the electric utility program at MIT's Energy Laboratory, is right on the money when he says that the electric system of the future must offer not only access but also choice. Meaningful retail choice would allow a consumer to select energy according to any criteria, including environmental standards. Research into consumer preference consistently reveals the residential user's interest in clean energy that the conventional electric system fails to provide.

However, less than 30 percent of U.S. power is purchased by residential customers; large commercial and industrial interests constitute the largest group of users. Will an aluminum smelter or a glassmaker opt to buy clean power at a premium price? I see little positive evidence, which could presage a real environmental problem.

ADAM SERCHUK  
Research Coordinator  
Center for Global Change  
College Park, Md.

"Keeping the Lights On, Market Style" fails to address the significant impact of independent power producers (IPPs). While regional and local power producers have invested heavily in transmission lines, IPPs have gotten a free ride. Moreover, the former carry significant social baggage. For example, they cannot turn off someone's power for not paying. If regional and local power producers are forced out of the market owing to the lower rates of IPPs, state and local tax revenues will decline and the loss of valuable jobs will affect the local economies.

When an IPP closes its doors or decides not to sell its power, large power plants—which cannot be built overnight—will have to pick up the slack. Is a short-term gain worth the risk? Richard Tabors should incorporate some of these effects into his equations.

STANLEY M. WHITE  
Trumbull, Conn.

Continued on page 74



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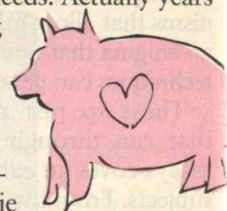
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## LETTERS

CONTINUED FROM PAGE 73

### NOT BY PIG ORGANS ALONE

"Pork Liver, Anyone?" by Steven Alan Edwards (*TR July 1996*) may oversell the high-tech option for resolving the organ donor shortage. While successful xenotransplantation appears closer than ever, we run the risk of pinning too much hope on pig or other animal organs to meet all transplant needs. Actually years away from becoming a standard procedure, xenotransplantation today offers little comfort to the 3,000 transplant candidates who will die waiting for an organ this year.



Even enthusiastic proponents of xenotransplantation realize the procedure is not the only answer. At last summer's international meeting of the Society for Organ Sharing, Dr. Fritz Bach, a leader in xenotransplantation research, pointed out that we need to view the procedure not as a replacement for donated organs but as an additional option.

In the United States, two-thirds of eligible potential donors are lost to breakdowns in hospital communication—not to public apathy, as most believe. More than 25 percent of the families of eligible organ donor candidates are not even asked to consider donation. And those who are approached are asked in a haphazard manner, leading them to decline authorization for a donation.

Extensive research by the Partnership for Organ Donation and the Harvard School of Public Health, in collaboration with hospitals and organ procurement organizations, indicates that donor numbers could double if all potential candidates in hospitals were identified and their families were asked to consider organ donation in an optimal fashion. These improvements depend not on advances in medicine or technology but on better hospital procedures.

CAROL L. BEASLEY

The Partnership for Organ Donation  
STEVEN L. GORMAKER  
Harvard School of Public Health  
Boston, Mass.



# Phenomena

BY DAVID BRITTAN

## Repositioning Nature's Bounty

A Plan for Targeting the Youth Market  
Prepared by Scraatchi & Scraatchi  
(Madison Avenue, New York City)  
for United Produce Growers of America

SINCE the beginning of agriculture, growers of fruits and vegetables have labored under the illusion that their products would sell themselves. They reasoned that produce is about nutrition, something everybody wants. But after 12,000 years of disappointing sales, growers are realizing they need professional marketing help. This is particularly true for penetrating the elusive youth market, five- to ten-year-olds. The time is ripe, if you'll pardon the expression, for a paradigm shift in marketing veggies to kids.

Under the old paradigm, children were told to eat fruits and vegetables because they were "good for you." Our research shows that this concept does not resonate with the young consumer. Skateboarding in a drained swimming pool is not "good for you." Neither is jamming small objects up your nose or turning your eyelids inside out. Yet kids consistently rate these activities more appealing than choking down a bite of broccoli.

The federal government completely misperceived the tastes of the youth segment when it instituted its "5 a Day for Better Health" program in 1991. To the average kid, 5 servings of fruits and vegetables might as well be 500. In fact, it would be easier to pass an elephant through a boa constrictor than to pass one piece of fresh fruit, three-quarters of a cup of 100 percent juice, half a cup of cut vegetable, one cup of leafy vegetable, and half a cup of dried peas or beans through the body

of an eight-year-old. To no one's surprise, half the elementary school kids questioned on the recent National Child Health Survey reported eating zero or one fruit and zero or one vegetable the previous day.

But in the government's failure lies your opportunity. Kids now know they're "supposed" to eat five servings a day—all you have to do is make them want to. That's where the new paradigm comes in. We've designed a marketing approach that speaks directly to the fears and desires of five- to ten-year-olds. We've tried to address their negative perceptions about the product. We've thrown out tired old grownup product names like "asparagus" and "rutabaga"—which scream "vegetable"—and come up with bright new trademarks that kids respond to. We're designing a bold new line of kid-friendly colors to replace those boring greens. And we're working with genetic-engineering firms to make fruits and vegetables look more like familiar characters, such as Mighty Morphin Power Rangers™.

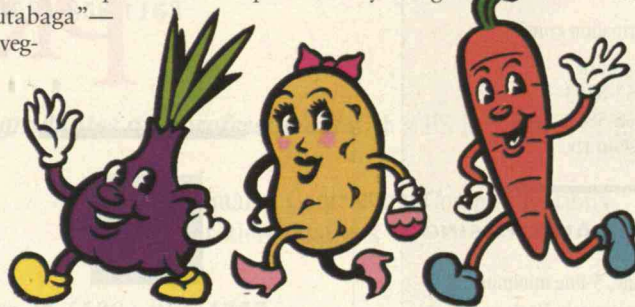
We predict that by following the product plans outlined here, the United Produce Growers of America will be able to turn "5 a Day for Better Health" into "5 a Day for Better Wealth."

**APPLES.** *Negatives:* The skin. Children won't bite unless a parent removes it, usually by nibbling all the way around the fruit. This gets old fast, so parents buy their kids Chee-tos™ instead. *Recommendation:* Market the product prepeeled, adding chemical preservatives to retard browning. Step up R&D on skinless varieties. *New name:* Tree Pops™.

**ASPARAGUS.** *Negatives:* Reptilian appearance evokes terms like "scary," "primitive." Makes pee smell funny. *Recommendation:* Build identification with cuddly reptiles such as Teenage Mutant Ninja Turtles™. (Can anything be done about the, um, odor?) *New name:* Ninja Stix™.

**BROCCOLI.** *Negatives:* Smells like cabbage when cooking. Tiny spherules too similar to insect eggs. *Recommendation:* Draw attention to more appealing features, such as the cool rubber band. *New name:* Rubber-Dubber™.

**BRUSSELS SPROUTS.** *Negatives:* Taste like the bottom of a laundry hamper. Have pink wormy things



in the middle. *Recommendation:* Turn weaknesses into strengths by capitalizing on the popularity of gross products with names like Slime™ and Ooze™. *New name:* GerbilGuts™.

**CARROTS.** *Negatives:* Dirt. They look like something that was yanked out of the ground. Plus, all those wrinkles suggest this is a product older people might use. *Recommendation:* Minimize the perception that carrots are a root vegetable. Advertising should strongly imply extraterrestrial origin. Wash product thoroughly and try to develop more youthful-looking strains. *New name:* Skycicles™.

**CAULIFLOWER.** *Negatives:* Resembles a brain. *Recommendation:* Run Saturday a.m. commercials with neurosurgeons

explaining the difference ("Remember, kids, if it doesn't have two hemispheres, it's not a brain"). *New name:* Brai-No™.

**CUCUMBER.** *Negatives:* Squishy in the middle. Too unwieldy to eat as a snack. *Recommendation:* Get rid of the squishy stuff; replace with a toy surprise or a delicious creamy filling. For enhanced portability, package with clips that attach to belt or bicycle. *New name:* The Klub™.

**ORANGES.** *Negatives:* Hard to operate. Kids can't peel them, and grownups leave the yucky white membrane on. Product can be cut into wedges, but kids use them as "orange teeth" instead of eating. *Recommendation:* Market as individually shrink-wrapped segments. Leverage the flavor similarity to orange Froot-Loops™ (though warning labels should advise against adding milk). *New name:* Juicy Loops™.

**PEACHES.** *Negatives:* Disgusting fuzz. Slimy pit. *Recommendation:* Reposition the product as a game instead of a fruit. Kids score points if they eat the inside without touching their lips to the "Bronto Hide®" or the "Cootie Stone®." *New name:* DinoSphere™.

**PEAS.** *Negatives:* Old-sneaker taste, unappetizing texture. *Recommendation:* Package in a Pez™ dispenser and encourage kids to swallow them whole. *New name:* Earth-Pills™.

**SPINACH,** lettuce, cabbage, and other leafy vegetables. *Negatives:* Moths eat leaves, giraffes eat leaves, even pandas eat leaves, but kids don't. Our research shows there is simply no way to market these losers. *Recommendation:* Discontinue.





# Technology Review Careers



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## ISSUE AND CLOSING DATES

ISSUE	RESERVATION DATE:	PUBLICATION DATE:
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